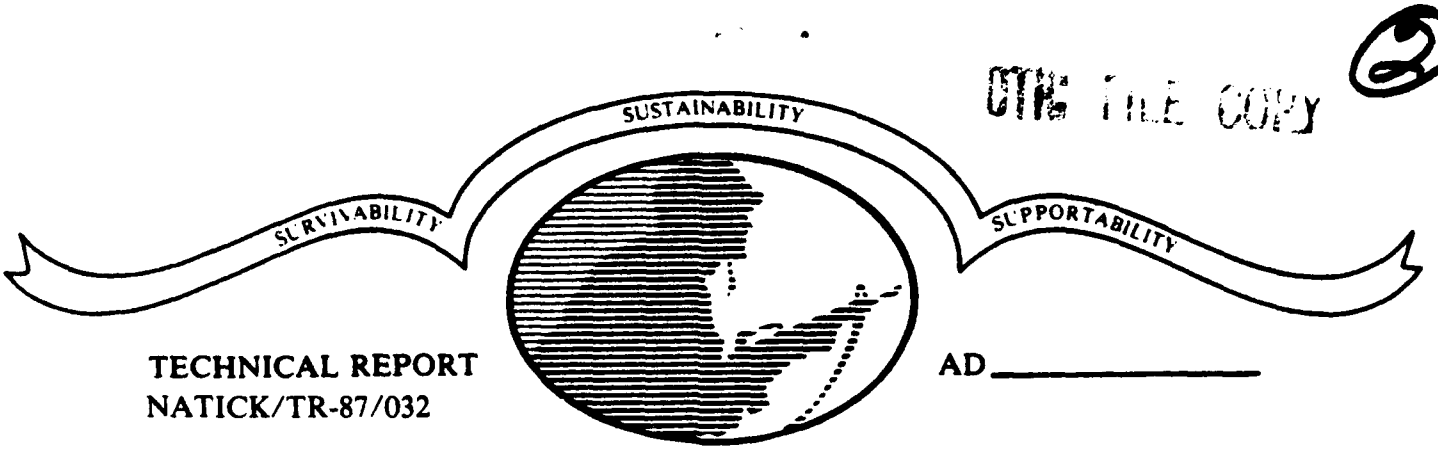

TECHNICAL REPORT
NATICK/TR-87/032

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TWELVE-DAY FIELD TEST OF RATION, LIGHTWEIGHT, 30-DAY AT FORT CHAFFEE, ARKANSAS

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During the period 26 September to 9 October 1985, a field test of the prototype Ration, Lightweight, 30-Day (RLW-30) was conducted at Ft. Chaffee, Arkansas. The test was designed to evaluate the RLW-30 under field conditions. For comparison purposes, some of the subjects consumed the Food Packet Assault (FPA) ration or a combination of: Meal, Ready-to-Eat (MRE) components, other ration components, and commercial products. Subjects in the RLW-30 and FPA ration groups recorded the amount of ration consumed, acceptability of the rations, frequencies of urination and defecation, and amount of water consumed on a daily basis. Posttest questionnaires required subjects to rate the ration on acceptability, portion size, variety, rehydration, and to recommend changes. In addition, personal interviews were conducted. Medical and nutritional data were gathered in the form of daily food intake, body weight, body composition, and hydration status.

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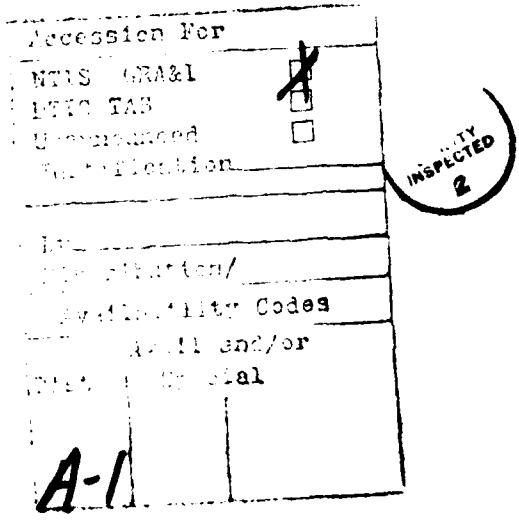
PREFACE

During the period 26 September to 9 October 1985, a field test of the prototype Ration, Lightweight, 30-Day (RLW-30) was conducted at Ft. Chaffee, Arkansas as part of work unit #AH99BF034 under project #FTB1234 "Sensory and Behavioral Engineering of Low-Volume Rations." For comparison purposes, some of the soldiers consumed either the Food Packet Assault (FPA) ration or a mixture of various ration components and commercial foods. The present report describes the results of this field test.

The authors would like to acknowledge the help of members of Company B, the 9th Infantry Division Scouts of Ft. Lewis, Washington who participated in this field test.



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INTRODUCTION

During the period 26 September to 9 October 1985, a field test of the prototype Ration, Lightweight, 30-Day (RLW-30) was conducted at Ft. Chaffee, Arkansas. The test was designed to evaluate the RLW-30 under field conditions. At the same time a control group at Ft. Chaffee tested the Food Packet Assault (FPA) which is to be introduced into the system in 1987; the FPA had been field-tested previously. The RLW-30 test was scheduled to run for 14 days, however, the final two days were spent in a staging area and at military airports where adherence to the experimental rations was not practical after day 12. Nutritional and medical aspects of ration consumption data are reported for the first 12 days of the Field Training Exercise. Some data were collected for the final two days and where appropriate they are included.

RLW-30 Background

The RLW-30 is a lightweight, low-volume ration designed for use by Special Operations Forces (SOF) and other specialized troops in surveillance and reconnaissance missions. It is designed to be used for up to 30 days without resupply. Present ration packets are too bulky or heavy, denying space needed for mission-essential equipment and none have been accepted for longer than ten days of use.

The requirement for the RLW-30 states that it shall be a preassembled, calorically restricted ration packaged in a CB-proof, modular packet that can be eaten as is, although the option of rehydrating some components is desirable. The desired daily ration characteristics as specified in the SOF requirement and by the Office of The Surgeon General (OTSG) are shown in Table 1.

TABLE 1. RLW-30 Daily Ration Characteristics as Specified by SOF and OTSG Requirements

Weight (g)	454 or less
Volume (in^3)	45 or less
Kilocalories	1400-1500*
Protein (g)	50-60*
CHO (g)	175-200*
Fat (g)	50-60*

* If additional weight and space for more food exists, additional fat and carbohydrate are allowed, while keeping the calories from fat under 40% (unless testing indicates a higher fat content is acceptable).

Development of the RLW-30 began in October 1984 at Natick Research, Development and Engineering Center. By March 1985,a series of RLW-30 breakfast, lunch, dinner, and snack bar prototypes had been developed. Each preassembled, single-meal packet contained approximately 1600 kcal and consisted of various combinations of RLW-30 dehydrated entree bars, bread-cracker type bars, dessert bars, dairy bars, a chocolate bar from the Meal, Ready-to-Eat (MRE), commercial fruit leathers, lemon tea powder, and an orange beverage bar from the Food Packet Assault (FPA). This lightweight ration was field-tested over a seven-day period (24 March to 1 April 1985) at Fort Bliss, TX by 47 members of the 9th Infantry Division (9ID) Scouts of Fort Lewis, WA during Operation Borderstar (Cardello, Popper, Lord, & Shaw, in press).[1] This test provided useful data in the development of the RLW-30 and, although the food components were generally well liked, the packet was modified to incorporate many of the changes suggested by the 9ID Scouts. This modified RLW-30 was used by 73 participants in the 12-day test at Ft. Chaffee described here. The components of the second prototype RLW-30 are listed in Table 2.

TABLE 2. RLW-30 Ration Components (second prototype)

Entrees	Bread Crisp	Cereal Bars
Chicken a la King	Nacho Cheese	Granola
Beef Stew	Tamale	Oatmeal
Pork and Rice	Pizza	Shredded Wheat
Chicken Stew	Bacon Cheese	Wheat Chex
Spaghetti	Orange Nut	Life
Chili	Apple	Grapenuts
Dairy Bars	**Dessert Bars**	**Beverage Bars**
Almond	Blueberry	Orange
Strawberry	Chocolate Chip	Lemon-Lime
Orange-Pineapple	Apple Cinnamon	Strawberry
Banana	Pecan	Cherry
Mixed Nut	Graham	Tropical Punch
Orange-Pineapple-Coconut		Grape
		Raspberry
		Lemonade
		Lemon Tea

Other
Fruit Pocket, Cocoa Bar, Beef Jerky

FPA Background

The FPA is a calorically restricted ration packet which will replace the Food Packet, Long Range Patrol (LRP) in 1987. Although it is significantly lower in volume than the LRP, it does not meet the RLW-30 volume requirements. It is designed for use by dismounted troops for assault, reconnaissance, and other missions where resupply is not established nor planned or in any situation where space and

weight are important. The nutritional design of the Food Packet Assault allows its use for up to ten days without performance decrements. The FPA is configured into six menus, all components can be eaten dry and some can be reconstituted. Each menu contains a dehydrated entree, two cereal bars, a beverage bar, a snack item (pepperoni sticks or beef jerky), and various confectionary items to balance the caloric requirement. Each packet from the procurement used in this testing provides 1762 kilocalories, has a gross weight of 480 grams, a volume of 84 cubic inches and is packaged in a flat, flexible, waterproof container. The FPA has been tested by both U.S. Marine Corps and U.S. Army personnel in hot desert climates and cold weather environments for periods up to ten days. Data on performance effectiveness, acceptance, operational characteristics, and water requirements have been collected and validated by the U.S. Army Combined Arms School, Ft. Leavenworth, Kansas (Walker, 1986).[2] The components of the FPA are listed in Table 3.

TABLE 3. FPA Ration Components

Entrees	Dessert/Confectionary Items
Chicken Stew	Oatmeal Bar
Beef and Vegetables	Chocolate Bar
Chicken and Rice	Fudge Bar
Chicken a la King	Vanilla Pudding
Spaghetti and Meat Sauce	Chocolate Pudding
Escalloped Potatoes with Pork	Fig Bar
	Caramels
Snack Items	Granola Bar
Pepperoni	
Beef Jerky	Beverage Bar
	Orange

RLW/FPA Comparison

While the FPA is an adequate ration for certain missions, it does not meet the requirements specified by SOF and OTSG (as can be seen in Table 4). The FPA weighs 10.6% more than the RLW and its volume is 86.7% greater with 9.6% fewer kilocalories. Thus, a new ration was required to meet SOF's operational requirements.

TABLE 4. RLW-30 and FPA Ration Characteristics

	RLW	FPA
Weight (g)	434	480
Volume (in^3)	<45	84
Kilocalories	1950	1762
Protein (g)	59	73
CHO (g)	215	217
Fat (g)	95	66

METHOD

Subjects

Subjects for the test were 73 members of Company B, the 9th Infantry Division Scouts of Ft. Lewis, Washington.

Test Design

The soldiers were divided into three groups: (1) the calorically restricted RLW-30 group (N = 42), (2) the calorically restricted FPA group (N = 23), and (3) a normal group (N = 8) who were allowed to bring whatever food they desired with them. This third group was included to simulate what the troops would have eaten if Natick had not been conducting the study. MRE components were available to this group in addition to other ration components and commercial products that soldiers had available (i.e., not issued). Subjects were briefed on the following prior to the start of the test: (1) the ration components, (2) rehydration instructions, (3) the Daily Ration Log Books, (4) test conditions, (5) the importance of not taking additional food or drink to the field, and (6) the uses of the test results for future product development.

For operational purposes, soldiers were also designated as Command & Control groups and Field patrols. Consequently, each operational group was composed of soldiers from the various experimental groups: RLW-30, FPA, and/or Normal. The Command and Control groups remained stationary while the Patrol groups conducted surveillance and reconnaissance missions in the field. The Scouts were not aware of the exercise in advance and were awakened at 0500 hours on 26 September, the first day of the test at Ft. Lewis, WA. They left for Ft. Chaffee, AR at 2000 hours that evening and field patrols were inserted during an airborne operation early on the morning of 27 September.

Materials

Data on acceptability were collected by three methods: Daily Ration Log Books, Posttest questionnaires, and personal interviews -- all of which were conducted following the test. Sample Daily Ration Log Books and questionnaires may be found in Appendix A.

Procedure

Each man carried his own Daily Ration Log Book in which he recorded daily the amount of each ration component he had consumed, acceptability, frequencies of urination and defecation, and the number of quarts of water consumed. Posttest questionnaires were administered at Ft. Chaffee

after the men came in from the field. The questionnaire required the subjects to rate the ration components for acceptability, portion sizes, variety of individual items, and required responses to other questions concerning rehydration of meals and recommendations for changes to the rations. Personal interviews were conducted after the questionnaires were completed.

Data on nutritional and medical aspects of the rations were also gathered. Measures included: daily food intakes, body weight, body composition, and hydration status.

Prior to deployment at Ft. Lewis, WA, body weights were taken in garrison on a medical swinging beam platform balance accurate to ±1/8 lb. Body weights taken in the field were measured on portable electronic digital scales (SECA model 770) accurate to ±0.1 g. Plywood boards placed under the scales provided a stable surface during field weighings. The scales were calibrated with 100-lb scale calibration weights. The soldiers were weighed at 0600 hours wearing only T-shirts, shorts, and socks.

Body fat was estimated using the standard Army skinfold caliper technique (Teves, Vogel, Carlson, & Schnakenberg, 1986).[3] The same anthropometrist conducted both the pre- and postmeasurements. Body fat was estimated by the sum of four skinfold determinations (bicep, tricep, subscapular, and suprailiac) according to equations developed by Durnin and Womersley (1974).[4]

Urine specific gravities were determined on first void in the morning urine samples on days 0, 3, 7, 10, and 12. Each Scout was given a small sealable plastic bag with six 2.0-mL prelabeled plastic snap-cap test tubes for urine samples. Field patrol units that were inaccessible due to terrain or operational security constraints collected the plastic tubes containing urine samples, placed them in a plastic bag, and transported the samples to a site accessible by truck. The location of these urine samples was radioed to the Command and Control Base group and the samples were subsequently picked up and analyzed on the same day. Samples were analyzed for specific gravity with a TS refractometer (American Optical, model 10400A) that provided readings accurate to the nearest 0.001 units.

RESULTS

RLW-30 Daily Ration Log Book

Rating responses recorded for the 14-day RLW-30 test are analyzed in Appendix B.

Acceptability. Each ration component (i.e., entree bars, crispy bread bars, dairy bars, cereal bars, dessert bars, cocoa beverage bars, fruit beverage bars, fruit pockets, and beef jerky) was rated daily on a nine-point hedonic scale (1 = "dislike extremely," 5 = "neutral," 9 = "like extremely") (Peryam & Girardot, 1952).[5] Table 5 shows the mean rating for each component pooled over subjects and the 14 days of the test. All food bars were rated acceptable with the fruit beverage bars rated highest (mean = 7.63, sd = 1.62) and with the cocoa beverage bars rated lowest (mean = 6.28, sd = 1.93).

TABLE 5. RLW-30 Daily Log Book Results
Mean Acceptability

	Mean	SD	N
ENTREE BARS	7.42	1.46	325
CRISPY BREAD BARS	6.69	1.83	326
DAIRY BARS	6.44	2.23	303
CEREAL BARS	7.29	2.08	336
DESSERT BARS	7.53	1.56	336
COCOA BEVERAGE BARS	6.28	1.93	292
FRUIT BEVERAGE BARS	7.63	1.62	338
FRUIT POCKETS	7.52	1.78	331
BEEF JERKY	7.80	2.17	71

Fig. 1 shows mean acceptability (pooled over subjects and bars) as a function of day. Note that there is little change in overall acceptability over the last 11 days of the test (second day: mean = 7.20, sd = 0.63; last day: mean = 7.40, sd = 0.73).

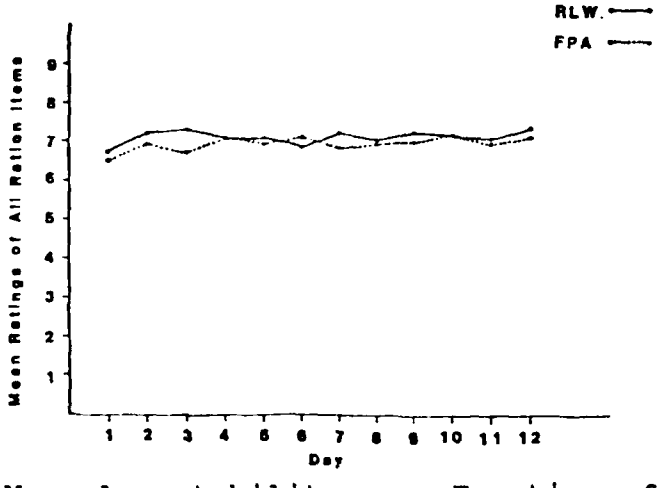

Figure 1. Mean Acceptability as a Function of Day.

Urination and Defecation. Fig. 2 shows mean urinations as a function of day. Subjects averaged 3.09 urinations per day (sd = 1.19) over the course of the test. Fig. 3 shows mean defecations as a function of day. Subjects averaged 0.64 defecations per day (sd = 0.75) over the course of the test.

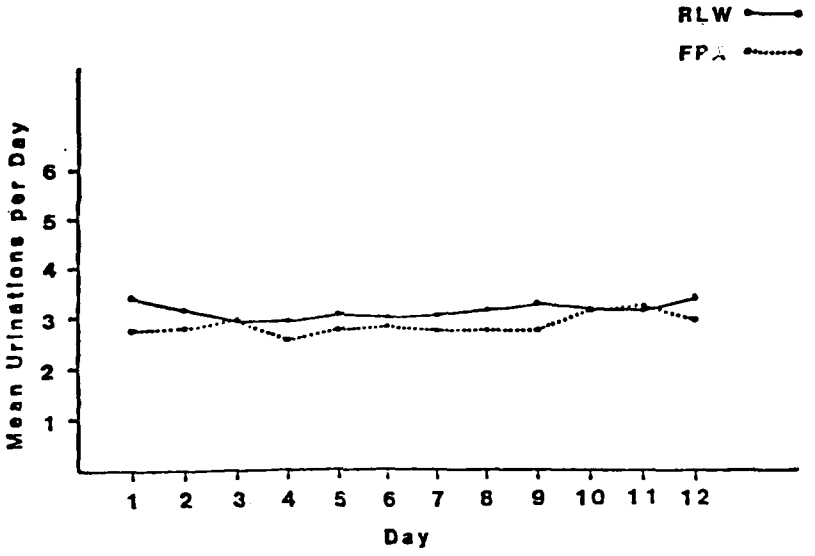

Figure 2. Mean Urinations as a Function of Day.

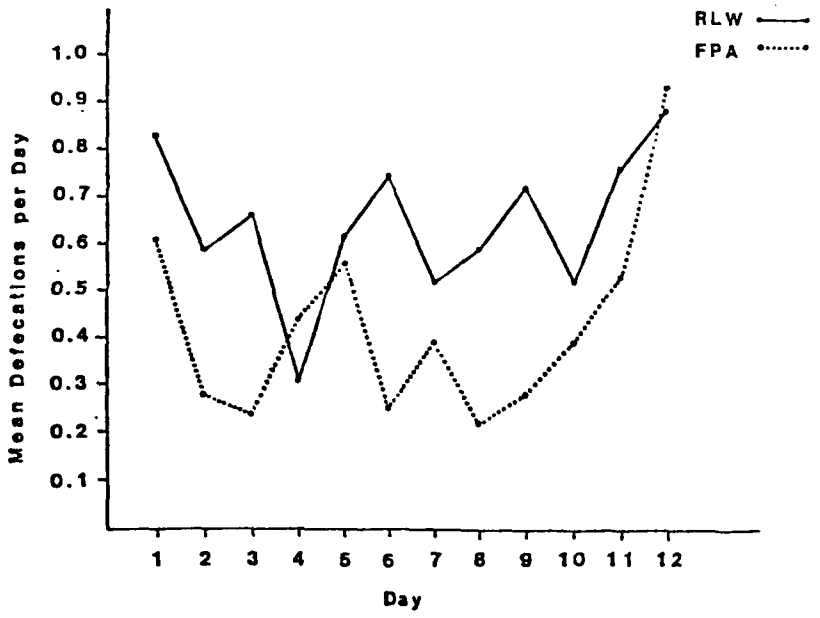

Figure 3. Mean Defecations as a Function of Day.

Water Usage. As shown in Table 6, most subjects (71.5%) drank 1.50 to 2.50 quarts of water per day.

TABLE 6. RLW-30 Daily Log Book Results
Mean Volume of Water Drunk per Day

Quarts	Percentage of subjects
0.25	0.3
0.50	1.4
0.75	2.0
1.00	11.3
1.50	23.1
2.00	33.8
2.50	14.6
3.00	5.4
3.50	2.8
4.00	4.5
no response	0.8

FPA Daily Ration Log Book

Rating responses recorded ofr the 14-day RPA test are analyzed in Appendix C.

Acceptability. Each ration component (i.e., entree bars, granola bars, oatmeal cookie bars, chocolate/fudge bars, pudding bars, beverage bars, fig bars, and beef jerky/pepperoni) was rated daily on the nine-point scale used by the RLW-30 group. Table 7 shows the mean rating for each component pooled over the 14 days of the test. All bars were rated acceptable with fig bars rated highest (mean = 8.31, sd = 1.12) and with chocolate/fudge bars rated lowest (mean = 5.05, sd = 2.38). Fig. 1 shows mean acceptability (pooled over subjects and bars) as a function of day. Note that there is little change in overall acceptability over the last 11 days of the test (second day: = 6.90, sd = 1.12; last day = 7.19, sd = 1.20).

TABLE 7. FPA Daily Log Book Results
Mean Acceptability

	Mean	SD	N
ENTREE BARS	6.64	1.93	195
GRANOLA BARS	6.55	2.37	198
OATMEAL COOKIE BARS	8.07	1.67	204
CHOCOLATE/FUDGE BARS	5.05	2.38	179
PUDDING BARS	5.77	2.69	86
BEVERAGE BARS	7.44	1.61	195
FIG BARS	8.31	1.12	164
BEEF JERKY/PEPPERONI	8.17	1.09	204

Urination and Defecation. Fig. 2 shows mean urinations as a function of day. Subjects averaged 2.81 urinations per

day (sd = 1.14). Fig. 3 shows mean defecations as a function of day. Subjects averaged 0.41 defecations per day (sd = 0.57).

Water Usage. As shown in Table 8, most subjects (51.4%) drank 1.50 to 2.50 quarts of water per day.

TABLE 8. FPA Daily Log Book Results
Mean Volume of Water Drunk per Day

Quarts	Percentage of Subjects
0.25	0.9
0.50	1.9
0.75	5.1
1.00	22.2
1.50	12.5
2.00	25.5
2.50	13.4
3.00	7.9
3.50	4.2
4.00	4.2
no response	2.3

RLW-30/FPA Log Book Comparison

While the magnitude of the difference between mean acceptability for these two rations is relatively small, the RLW did seem to be consistently rated higher. On 11 of 12 days the RLW received a higher mean acceptability than the FPA did (binomial test, $p < 0.001$). Mean acceptability for the RLW (pooled across subjects, components, and days) was 7.17; for the FPA it was 6.98. For both the RLW and FPA, acceptability was the lowest on the first day of the 12 days of the test. For both Day 1 and Day 12, RLW sd's were lower than FPA sd's. This may be an important point which indicates more consistent ratings for the RLW.

RLW-30 Questionnaire Summary

Performance. Subjects completed a lengthy questionnaire after returning from the field; complete results may be found in Appendix D. They felt that the ration had a slightly negative effect on their performance (mean = 4.48, sd = 1.34, 1 = "extremely positive," 4 = "neutral," 7 = "extremely negative"). However, they did feel that they could eat the ration for 14.64 (sd = 10.81) additional days without an adverse effect on their mission performance. This result must be viewed with caution since the soldiers knew that the ration was designed to last 30 days and their answers may have been affected by that knowledge.

Desired Changes in Ration. The most desired change was that the ration "should be more filling." Over half the

subjects (61.8%) felt this was the most important change to be made. The change ranked second most important (by 17.6%) was that "more dried meat should be added." The third most wanted change (8.8%) was that the "ration should taste better."

Variety. Overall, lack of variety did not seem to be a problem. Subjects rated how satisfied they were with the variety of each component (1 = "enough variety," 4 = "should have much more variety"). Ratings ranged from 1.55 (sd = 0.94) for the fruit beverage bars to 2.18 (sd = 1.19) for the dessert bars. This is consistent with the log book data which show no monotony effect over the course of the test.

Water Usage. Subjects indicated that they often (mean = 3.18, sd = 1.59; 1 = "always," 4 = "fairly often," 7 = "never") had enough water available to rehydrate food items. However, they reported that the amount of water brought into the field was enough to satisfy their thirst only "fairly often" to "sometimes" (mean = 4.30, sd = 1.55; same scale as above). Exactly half of the subjects (50%) reported that they were resupplied with water and 73.5% reported that they obtained pickup water. Of those that did obtain pickup water, only 45.2% reported using iodine tablets to disinfect it. Self-reported averages of water used each day for eating and drinking (almost 2 quarts) were consistent with log book results. As shown in Table 9, entree bars were almost always rehydrated and cereal bars were almost never rehydrated.

TABLE 9. RLW-30 Questionnaire Results
Rehydration of Food Items*

	Mean	SD
ENTREE BARS	4.79	0.64
FRUIT BEVERAGE BARS	3.32	1.30
DAIRY BARS	1.76	0.97
CEREAL BARS	1.36	0.78

* The Cocoa Beverage Bar was inadvertently omitted from this question.

KEY: 1 = "never," 2 = "less than half the time," 3 = "about half the time," 4 = "more than half the time," 5 = "always."

The main reasons given for not rehydrating items were that the items "tasted better dry" (35.3%), "there was not enough water available" (35.3%), "it was too much trouble" (26.5%), and "there was not enough time" (23.5%). Hot water was used to rehydrate entree bars over half the time (mean = 3.85, sd = 1.18; same scale as above). The main reasons given for not using hot water were that "there was not enough

time" (23.5%), "no equipment available for heating" (17.6%), and "too much trouble" (14.7%).

Satiation. Over half of the soldiers (61.8%) indicated that the primary reason they did not eat enough was that "there were not enough rations available." The only other reason cited by many was that they "disliked the rations" (20.6%). The subjects reported some hunger (mean = 2.82, sd = 0.90; 1 = "got enough to eat," 4 = "was almost always hungry") but it did not seem to be overwhelming.

Miscellaneous. The ration was rated as "slightly" to "moderately convenient" (mean = 2.47, sd = 1.52; 1 = "extremely convenient," 4 = "neutral," 7= "extremely inconvenient"). Why the rations were not considered more convenient is somewhat puzzling. As indicated in Appendix D, 79.4 % of the subjects did not rank "be lighter" as an important change, 79.4% did not rank "take up less space," 73.5% did not rank "packages be easier to open," 47.1% did not rank "have fewer bars that need to be rehydrated," and 58.8% did not rank "have bars that rehydrate faster." In addition, only 26.5% reported that they did not rehydrate because it was "too much trouble" and only 14.7% reported that they did not rehydrate with hot water because it was "too much trouble." None of the subjects reported that they did not eat enough because it was "too much trouble."

For all items, over 50% of the subjects reported that there was "just the right amount" in the accessory packet. Sugar (36.4%), cream (39.4%), and coffee (39.4%) were the items that finished highest in the "needed more" category.

Table 10 shows the factors considered most important by the subjects for a mission such as this one.

TABLE 10. RLW-30 Questionnaire Results
Most Important Factors for Combat Rations

	Mean Rank	
light weight	2.10	
gives enough energy	2.36	
takes up little space	2.38	1.29
stops hunger	3.38	1.04
tastes good	4.03	1.43

KEY: 1 = "most important," 5 = "least important."

Table 11 shows the mean rating of the RLW-30 on the above factors.

TABLE 11. RLW-30 Questionnaire Results
Mean Ratings of Important Factors for Combat Rations

	Mean	SD
lightweight	1.46	0.75
gives enough energy	2.97	0.98
takes up little space	1.52	0.76
stops hunger	3.42	0.66
tastes good	2.21	0.99

KEY: 1 = "excellent," 2 = "good," 3 = "fair," 4 = "poor."

Although the RLW was rated at "fair" to "poor" for "stops hunger," this factor was considered relatively unimportant for this sort of mission by the soldiers. For "gives energy" which was ranked first in importance by the most soldiers (38.2%) for a mission such as the one they were on, the RLW-30 Day was considered "fair."

FPA Questionnaire Summary

Performance. Subjects completed a lengthy questionnaire after returning from the field (complete results may be found in Appendix E). They felt that the ration had "no effect" on their performance (mean = 4.14, sd = 1.15; 1 = "extremely positive," 4 = "neutral," 7 = "extremely negative"). In addition, they felt that they could eat the ration for 12.64 (sd = 6.95) additional days without an adverse effect on their mission performance.

Desired Changes in Ration. The most desired change was that the ration "should be more filling." One-third (33.3%) felt that this was the most important change to be made. The changes ranked most important by the second most were that the ration "should make you less thirsty" (19.0%) and that it "should have more variety" (19.0%).

Variety. For some of the items, lack of variety was a problem. Subjects rated how satisfied they were with the variety of each component (1 = "enough variety," 4 = "should have much more variety"). Ratings ranged from 1.95 (sd = 1.16) for the granola/oatmeal bars to 3.24 (sd = 0.94) for the beverage bars.

Water Usage. Subjects indicated that they "almost always" to "often" (mean = 2.48, sd = 1.40; 1 = "always," 4 = "fairly often," 7 = "never") had enough water available to rehydrate food items. In addition, they reported that the amount of water they brought into the field was enough to satisfy their thirst "often" to "fairly often" (mean = 3.29, sd = 1.88; same scale as above). Over half of the subjects

(61.9%) reported that they were resupplied with water during the exercise and 70% indicated that they obtained pickup water. Of those that did obtain pickup water, only 53.3% reported using iodine tablets to disinfect it. Self-reported averages of water used each day for eating and drinking (almost 2 quarts) were consistent with log book results.

As shown in Table 12, entree bars were almost always rehydrated and beverage bars were rehydrated about half of the time.

TABLE 12. FPA Questionnaire Results
Rehydration of Food Items

	Mean	SD
ENTREE BARS	4.52	0.98
PUDDING BARS	4.05	1.36
BEVERAGE BARS	2.86	1.35

KEY: 1 = "never," 2 = "less than half the time," 3 = "about half the time," 4 = "more than half the time," 5 = "always."

The main reasons given for not rehydrating items were that it was "too much trouble" (33.3%), "dehydrated foods tasted better dry" (19.0%), "dehydrated foods had better texture dry" (19.0%), and that "there was not enough water available for mixing" (19.0%). Hot water was used to rehydrate entree bars more than half the time (mean = 4.05, sd = 1.24; same scale as above). The main reasons given for not using hot water were that "there was no equipment available for heating" (38.1%), "that it was too much trouble" (14.3%) and that "there was not enough time" (14.3%).

Satiation. Almost half of the subjects (47.6%) indicated that the primary reason they did not eat enough was that "there were not enough rations available." The only other reason cited by many was that they "disliked the rations" (23.8%). The subjects reported some hunger (mean = 2.52, sd = 0.93; 1 = "got enough to eat," 4 = "was almost always hungry"), but it did not seem to be overwhelming.

Miscellaneous. The ration was rated as "moderately" to "slightly convenient" (mean = 2.62, sd =1.50; 1 = "extremely convenient," 4 = "neutral," 7 = "extremely convenient"). The fact that this ration was not rated more convenient should not be too surprising. Close to half of the subjects (57.3%) felt that "the ration should be lighter," 66.7% felt "it should take up less space," 52.5% felt "the packages should be easier to open," 62.0% felt "there should be fewer bars that need to be rehydrated," 61.9% felt "the bars should rehydrate faster," and 57.3% felt "it should not crumble as

much." However, only 33.3% reported that they did not rehydrate bars because "it was too much trouble" and only 14.3% reported that they did not rehydrate with hot water because "it was too much trouble." A few of the subjects (4.8%) reported not eating enough during the exercise because "it was too much trouble."

Sugar (38.1%), chewing gum (28.6%), and coffee (38.1%) were the only items for which less than 50% of the subjects thought there was "just the right amount." For cream, 52.4% felt there was "just the right amount."

Table 13 shows the factors considered most important by the subjects for a mission such as this one.

TABLE 13. FPA Questionnaire Results
Most Important Factors for Combat Rations

	Mean Rank	SD
gives enough energy	1.86	1.24
light weight	2.45	1.23
takes up little space	2.52	1.21
stops hunger	3.14	1.46
tastes good	4.15	0.93

KEY: 1 = "most important," 5 = "least important."

Table 14 shows the mean rating of the FPA on the above factors.

TABLE 14. FPA Questionnaire Results
Mean Ratings of Important Factors for Combat Rations

	Mean	SD
gives enough energy	2.57	0.93
light weight	1.91	0.89
takes up little space	2.52	0.81
stops hunger	3.14	0.91
tastes good	2.33	0.73

KEY: 1 = "excellent," 2 = "good," 3 = "fair," 4 = "poor."

Although the FPA was rated as "fair" for "stops hunger," this factor was considered relatively unimportant by soldiers for this sort of mission. For "gives energy" which was ranked most important by over half the soldiers (57.1%), the FPA was considered "good" to "fair."

RLW-30/FPA Questionnaire Comparison

Overall, there does not seem to be any major difference in acceptability between the rations. Table 15 shows the

mean ratings of the FPA and RLW on important factors for combat rations.

TABLE 15. Questionnaire Results
Mean Ratings of Important Factors for Combat Rations

	FPA	RLW
gives enough energy	2.57	2.97
light weight	1.91	1.46
takes up little space	2.52	1.52
stops hunger	3.14	3.42
tastes good	2.33	2.21

KEY: 1 = "excellent," 2 = "good," 3 = "fair," 4 = "poor."

The only factor for which the difference between the rations is relatively large is "takes up little space." In most respects such as acceptability and convenience, the rations seem relatively comparable. However, the main advantage (i.e., light weight, low volume) of the RLW (434 g, 45 cu in.) over the FPA (480 g, 84 cu in.) is maintained. Thus, for a 12-day test the RLW accomplishes its goals.

The Orange beverage bar and the Granola bar were identical in the RLW and FPA. There were no significant differences in the mean acceptability of these rations (orange beverage bar: RLW mean = 7.41, FPA mean = 7.62, t (53) = 0.51, $p > 0.05$; granola bar: RLW mean = 7.18, FPA mean = 6.19, t (53) = 1.68, $p > 0.05$). However, the difference for the Granola bar does approach significance. This may be due to a halo effect resulting from the RLW being rated higher overall than the FPA. It may be also due to the fact that for the RLW, it is called a cereal bar and for the FPA, it is called a dessert bar. However, why this should be is unclear. It may also be due to the fact that the granola and oatmeal bars were served daily in the FPA and every 6th menu in the RLW-30, causing a monotony effect in the FPA group.

Personal Interviews

No objective data were gathered from the personal interviews, however, some anecdotal information was obtained. Many of the subjects reported that they had heard of the rations prior to the test. In general, they had bad expectations -- they expected to have less energy and to be hungry most of the time. Some expressed a desire for and most indicated a willingness to eat vitamin supplements. Most of the reported hunger seemed to be due to a general desire to eat (e.g., "felt like eating") as opposed to a need to eat based on specific physical symptoms associated with hunger such as stomach contractions or light-headedness.

Nutritional and Medical Aspects

The statistical analyses for the following results sections on nutritional and medical aspects of ration consumption were accomplished by a one-way ANOVA. Where appropriate, multiple mean comparisons were ordered by a post-hoc Newman-Keuls procedure (Norris, 1985).[6] The significance level for these comparisons was set at $p < 0.05$.

Food Intakes. Mean daily food intakes were partitioned into kcal, protein, fat, and carbohydrate intakes for the patrols and for the less physically active Command and Control groups. These results are shown in Tables 16 and 17. The patrols consumed 96% of the kcal available in the RLW-30, but the more sedentary Command and Control group consumed only 86% of the same ration. A similar relationship was evident for the FPA ration.

TABLE 16. Mean Daily Food Intakes by Scout Patrols[a]

Group Designation	N	Calories (kcal)	Protein g/day	Fat g/day	Carbohydrate g/day
Normal	8	1028±57[b]	41±2[b]	41±3[b]	126±8
FPA	7	1717±33[c]	67±2[c]	62±1[c]	222±5
RLW-30	19	1883±22	58±1	84±1	224±3

[a]Values shown represent means ± standard error.
[b]Normal vs. FPA or RLW-30 significantly different, $p < 0.05$.
[c]RLW-30 vs. FPA significantly different, $p < 0.05$.

TABLE 17. Mean Daily Food Intakes by Command and Control Elements[a]

Designation	N	Calories (kcal)	Protein g/day	Fat g/day	Carbohydrate g/day
FPA	15	1551±45[b]	60.4±2.0[b]	55.7±1.7[b]	201.7±5.9
RLW-30	17	1680±44[b]	53.0±1.3[b]	75.2±2.5[b]	197.8±5.0

[a]Values shown represent means ± standard error.
[b]RLW-30 vs. FPA significantly different, $p < 0.05$.

Patrol scouts from the normal group who were permitted to take "food items that they normally would take to the field," received only 55% of the kcal of the RLW-30 group. This led to protein intakes less than recommended for nitrogen balance (the RDA for protein is 56 g/day) and barely enough carbohydrate to meet neurological and anti-ketogenic needs (100 g carbohydrate/day is considered the minimum amount). This "ration" would be evaluated as nutritionally unacceptable for most operational purposes. The FPA and

RLW-30 consumed similar nutrient intakes, with the RLW-30 having a small advantage over the FPA in total kcal intake. Protein intakes for both groups met the RDA of 56 g/day, but not the Military RDA of 100 g/day. Carbohydrate intakes were low but adequate for low physical activity situations. These levels of carbohydrate intakes would not be adequate to replenish muscle glycogen levels with chronic high levels of physical activity (Sherman & Costill, 1984).[7]

Table 18 and Figure 4 show mean daily kcal intakes for all groups. Note that the normal group tended to "hoard" or conserve their rations during the mid part of the 12-day FTX presumably as a "hedge" against running out prior to the 12th day. This led to some uneven caloric intakes ranging from 1700 to 600 kcal per man per day, whereas the groups consuming packaged rations (FPA and RLW-30) maintained a uniform level of energy intake throughout the 12-day study.

TABLE 18. Mean Daily Calorie Intake by Scout Patrols and Command and Control Elements*

Patrol	N	1	2	3	4	5	6	7	8	9	10	11	12
Normal	8	1679	1046	981	1176	901	803	762	820	590	766	1091	1720
FPA	7	1631	1586	1525	1663	1769	1763	1756	1833	1664	1816	1687	1991
RLW-30	19	1802	1770	1738	1816	1846	1821	1855	1953	1982	2097	2011	1909
Command and Control													
FPA	15	1296	1682	1632	1507	1644	1559	1374	1581	1620	1548	1634	1528
RLW-30	17	1572	1615	1625	1934	1825	1589	1762	1612	1634	1666	1640	1689

* Values shown are the daily group means in kcal/man/day ± standard error.

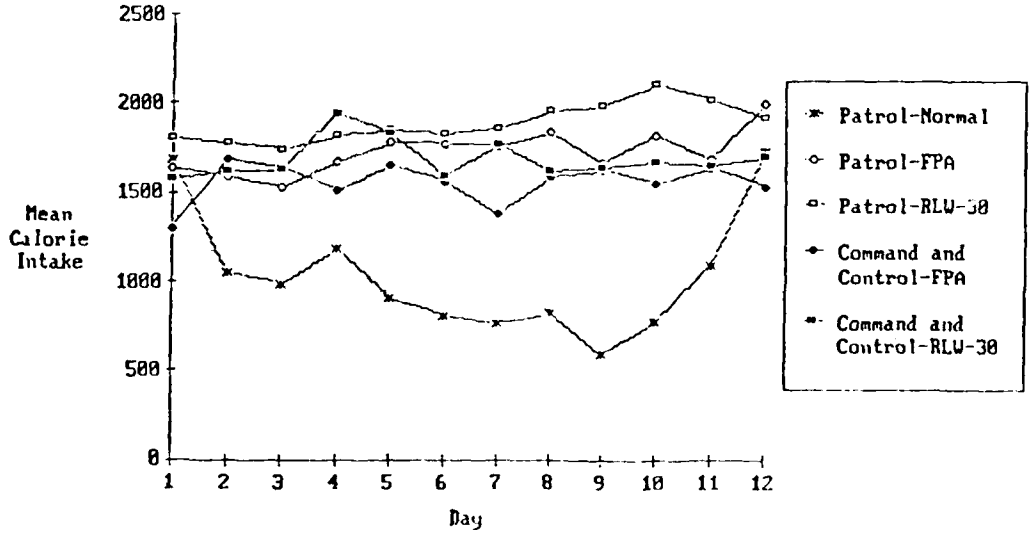

Figure 4. Mean Calorie Intake as a Function of Day.

Table 19 shows the mean daily percent of calories contributed by protein, fat, and carbohydrate. All three of the patrol groups consumed approximately 50% of their calories in the form of carbohydrate. Protein contributed less to the caloric intake in the RLW-30 group than it did in the other two groups. This aspect of ration design was formulated to reduce the water requirement for nitrogen excretion. Assuming equal sodium content, the RLW-30 protein intakes would require 72 mL less water per day for nitrogen excretion than that necessitated by FPA ration protein intakes.

TABLE 19. Mean Daily Percent of Calories from Protein, Fat, and Carbohydrate Consumed by Scout Patrols*

Group Designation	N	Protein	Fat	Carbohydrate
Normal	8	18.6±1.2	33.2±1.2	48.5±1.6
FPA	7	15.7±0.3	32.5±0.2	51.8±0.4
RLW-30	19	12.3±0.1	39.6±0.3	47.6±0.3

* values shown represent means ± standard error.

Body Weight Changes. Body weight loss is shown in Tables 20 and 21. All groups lost weight, as would be expected from the low caloric intakes. The normal group lost almost 9 lb/man over the 12-day test, which was significantly greater than both the FPA and RLW-30 groups who lost approximately 5 lb/man over the same period. The RLW-30 patrol group lost slightly more weight than the FPA patrol group. This difference was not statistically significant and may be related to the slightly larger initial body weights of the RLW-30 group. Larger body masses necessitate greater caloric requirements for both maintenance and work. In this context, the weight loss of the normal group was probably biased or accentuated by their greater initial body weights. Since patrols and not individuals were assigned to ration groups, it was not possible to balance body weight between patrols. It was possible, however, to balance body weights for the Command and Control groups. The weight loss for the FPA group was almost identical to that of the RLW-30 group in the Command and Control group.

TABLE 20. Body Weight Loss for Scout Patrols[a]
(in pounds)

Group Designation	N	Body Weight Day 0	Body Weight Day 12	Mean 12-day Weight Loss
Normal	8	182.5±5.9	173.6±5.9	8.9±1.0[b]
FPA	7	159.5±8.6	154.7±8.3	4.8±0.7
RLW-30	19	168.0±4.6	162.6±4.3	5.4±0.6

[a]Values shown represent the mean ± standard error.
[b]Normal compared to FPA or RLW-30 significantly different, $p < .05$

TABLE 21. Body Weight Loss for Command and Control Elements.*
(in pounds)

Group Designation	N	Body Weight Day 0	Body Weight Day 12	Mean 12-day Weight Loss
FPA	15	169.1±4.8	163.3±4.4	5.8±0.6
RLW-30	17	168.3±5.7	162.5±5.4	5.7±0.7

* Values shown represent the mean ± standard error.

Body Composition. The changes in percent body fat are shown in Table 22. Although all groups lost significant amounts of body fat over the 12-day FTX, there were no significant differences between ration groups for the Pre and Post changes in percent body fat.

TABLE 22. Percent Body Fat Estimates Before and After 12 Days of Consuming a Normal, FPA or RLW-30 Ration.*

Patrol	N	Pre	Post	Pre-Post
Normal	8	19.62±1.19	17.86±1.38	1.76±0.24
FPA	7	16.52±1.66	14.88±1.81	1.63±0.38
RLW-30	19	15.74±0.70	14.42±2.89	1.32±0.23
Command and Control				
FPA	15	17.49±0.89	15.59±0.93	1.90±0.28
RLW-30	17	16.49±0.99	14.70±0.91	1.79±0.21

* Values shown represent means ± standard error.

The less physically active Command and Control groups lost as much body fat as the patrol groups. This might be explained by the 10% lower caloric intakes of these groups, compensating for lower physical activity. The amount of body fat lost accounted for approximately 50% of the body weight lost over the 12-day FTX. The remaining 50% of the weight

loss could have been body water or lean body mass. Based upon the relatively mild weight loss and percent body fat loss, large decreases in lean body mass would seem unlikely. Urine specific gravities were generally elevated on day 12 indicating that optimum hydration and restoration of body water had not occurred.

Hydration Status. Overnight urine specific gravities were taken at various days throughout the 12-day FTX and are shown in Table 23 and Figure 5. Urine specific gravities of greater than 1.027 are indicative of suboptimal hydration status.

TABLE 23. Overnight Urine Specific Gravities Before, During, and After 12 Days of Consuming a Normal, FPA, or RLW-30 Ration*

Patrol	Day 0	Day 3	Day 7
Normal	1.021±0.001 (8)	1.026±0.001 (3)	1.029±0.002 (8)
FPA	1.025±0.001 (6)	1.029±0.000 (1)	1.029±0.001 (6)
RLW-30	1.023±0.001 (21)	1.027±0.001 (14)	1.030±0.001 (20)

	Day 10	Day 12
Normal	1.025±0.001 (8)	1.026±0.002 (8)
FPA	1.027±0.001 (6)	1.022±0.001 (7)
RLW-30	1.029±0.001 (17)	1.026±0.001 (17)

Command and Control	Day 0	Day 3	Day 7
FPA	1.023±0.002 (13)	1.025±0.002 (9)	1.023±0.001 (17)
RLW-30	1.021±0.002 (11)	1.025±0.002 (10)	1.025±0.001 (12)

	Day 10	Day 12
FPA	1.026±0.001 (12)	1.025±0.001 (15)
RLW-30	1.029±0.001 (9)	1.027±0.001 (13)

* Values shown are means ± standard error of urine samples collected upon first void in the morning, number of samples are in parentheses. Patrol Group was without water refill (relied upon ground water) Day 0 to Day 7 and with water refill available Day 7 to Day 12.

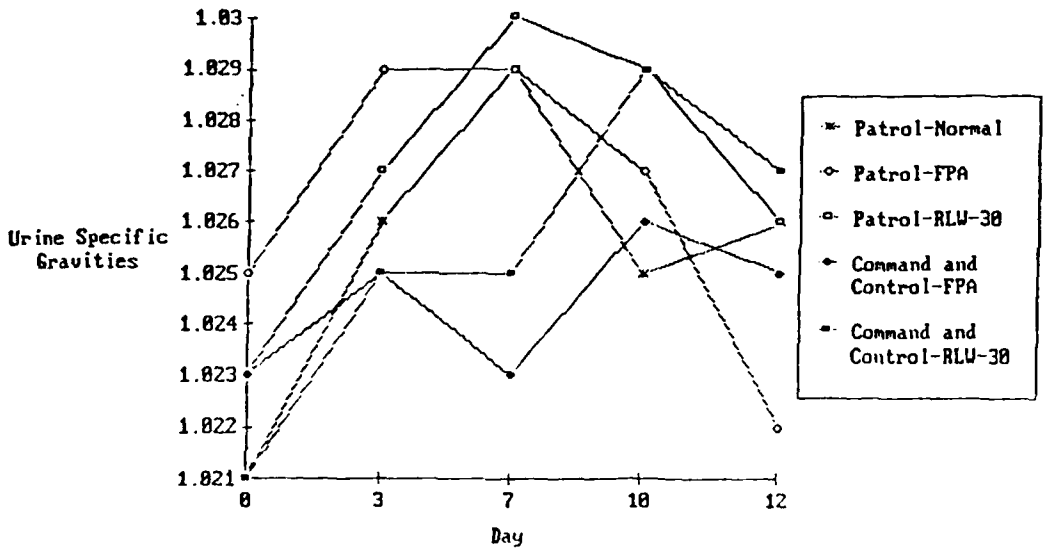

Figure 5. Overnight Urine Specific Gravities as a Function of Day.

Generally speaking, urine specific gravities increased in all groups after going to the field, with the increase being greater in the patrol than in the Command and Control groups. There were no consistent differences between ration groups to indicate an effect of ration on dehydration. The highest specific gravities were obtained on day 7 for the three patrol groups. All patrol groups relied upon ground water for resupply from day 1 to day 7. The specific gravities for all three ration groups were virtually identical for day 7.

CONCLUSION

Summary of Acceptability of the Ration

The low volume of the RLW-30 allows for one soldier to carry a supply that would last for 30 days. The present study has verified the positive acceptability of the ration for a period of 12 days. Possible future directions for research concerning the RLW-30 would be a field test that lasts for 30 days. Although overall daily acceptability ratings did not vary drastically during the present 12-day field test, more pronounced changes in either a positive or negative direction might be noted in a field test that lasts for 30 days. Similar changes might also be noted in regards to variety, the perception of the amount of days the ration could be eaten without it adversely affecting mission performance, and the perception of the performance of the ration with respect to important factors for a combat ration.

Summary of Nutritional and Medical Aspects of the Rations

Both the RLW-30 and FPA were superior to permitting soldiers to select and take their own mix of military and civilian food items to the field. The RLW-30 was an adequate ration for 12 days of moderate scouting patrol activities in a temperate environment. The patrols consuming the RLW-30 lost 3.2% of their body weight. Physical performance is usually maintained up to 10% loss in body weight (Taylor, Buskirk, Brozek, Anderson, & Grande, 1957).[8] The RLW-30 and the FPA appeared to be very similar in their ability to support the soldier for 12 days. Nutrient intakes (protein, fat, carbohydrate) body weight loss, percent body fat loss, and urine specific gravities were similar for both the RLW-30 and the FPA.

This document reports research undertaken at the US Army Natick Research, Development and Engineering Center and has been assigned No. NATICK/TR-87/032 in the series of reports approved for publication.

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APPENDIXES

A. Sample RLW-30 and FPA Daily Log Books and Questionnaires

B. RLW-30 Daily Ration Log Book Results

C. FPA Daily Ration Log Book Results

D. RLW-30 Posttest Questionnaire Results

E. FPA Posttest Questionnaire Results

Appendix A

Sample RLW-30 and FPA

Daily Log Books

and Questionnaires

DAILY RATION LOG-BOOK

US Army Natick
Research and Development Center
Natick, MA 01760

INSTRUCTIONS

As part of our study of new rations, we need to know how much you like your ration items, how many of them you eat and how they affect your bodily functions. It is important that the information be very accurate; therefore, please fill out this booklet once per day. Do not wait until the end of the exercise to fill it out; it cannot be done accurately that way. Once a day, turn the booklet to the page for that day and answer each of the questions that are asked by circling one of the response choices.

Remember, fill out one form each day. Be sure to circle the day of the week. You may make any additional comments about the rations on the COMMENTS AND NOTES pages located in the front and back of the log-book. Thank you for your help.

COMMENTS AND NOTES:

RLW-30 LOG BOOK

SUN MON TUES WED THURS FRI SAT (Circle One)

Please circle one of the numbers on the following scale to indicate how much you liked or disliked the ration items that you ate today. If you did not eat any of a particular item, place a check mark in the last column.

	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	Did Not Eat Any
Entree Bars	1	2	3	4	5	6	7	8	9	_
Crispy Bread Bars	1	2	3	4	5	6	7	8	9	_
Dairy Bars	1	2	3	4	5	6	7	8	9	_
Cereal Bars	1	2	3	4	5	6	7	8	9	_
Dessert Bars	1	2	3	4	5	6	7	8	9	_
Cocoa Beverage Bars	1	2	3	4	5	6	7	8	9	_
Fruit Beverage Bars	1	2	3	4	5	6	7	8	9	_
Fruit Pockets	1	2	3	4	5	6	7	8	9	_

Please circle one of the numbers listed below to indicate how may of each of the components you ate during the day. If you ate more than 4 of any of the components, please write the number that you ate in the space provided.

Entree Bars	0 1 2 3 4	_
Crispy Bread Bars	0 1 2 3 4	_
Dairy Bars	0 1 2 3 4	_
Cereal Bars	0 1 2 3 4	_
Dessert Bars	0 1 2 3 4	_
Cocoa Beverage Bars	0 1 2 3 4	_
Fruit Beverage Bars	0 1 2 3 4	_
Fruit Pockets	0 1 2 3 4	_

How many times did you urinate today? (Circle One)

0 1 2 3 4 5 6

How many times did you defecate today? (Circle One)

0 1 2 3 4 5 6

How many quarts of water did you drink today? (Circle One)

0 ¼ ½ ¾ 1 1½ 2 2½ 3 3½ 4

FPA LOG BOOK

SUN MON TUES WED THURS FRI SAT (Circle One)

Please circle one of the numbers on the following scale to indicate how much you liked or disliked the ration items that you ate today. If you did not eat any of a particular item, place a check mark in the last column.

	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	Did Not Eat Any
Entree Bars	1	2	3	4	5	6	7	8	9	—
Granola Bars	1	2	3	4	5	6	7	8	9	—
Oatmeal Cookie Bars	1	2	3	4	5	6	7	8	9	—
Chocolate/Fudge Bars	1	2	3	4	5	6	7	8	9	—
Pudding Bars	1	2	3	4	5	6	7	8	9	—
Beverage Bars	1	2	3	4	5	6	7	8	9	—
Fig Bars	1	2	3	4	5	6	7	8	9	—
Beef Jerky/Pepperoni	1	2	3	4	5	6	7	8	9	—

Please circle one of the numbers listed below to indicate how may of each of the components you ate during the day. If you ate more than 4 of any of the components, please write the number that you ate in the space provided.

Entree Bars	0	1	2	3	4	—
Granola Bars	0	1	2	3	4	—
Oatmeal Cookie Bars	0	1	2	3	4	—
Chocolate/Fudge Bars	0	1	2	3	4	—
Pudding Bars	0	1	2	3	4	—
Beverage Bars	0	1	2	3	4	—
Fig Bars	0	1	2	3	4	—
Beef Jerky/Pepperoni	0	1	2	3	4	—

How many times did you urinate today? (Circle One)

0 1 2 3 4 5 6

How many times did you defecate today? (Circle One)

0 1 2 3 4 5 6

How many quarts of water did you drink today? (Circle One)

0 ¼ ½ ¾ 1 1½ 2 2½ 3 3½ 4

LIGHT WEIGHT RATION QUESTIONNAIRE

Behavioral Sciences Division
U.S. Army Natick Research & Development Center
Natick, Massachusetts 01760-5014

During the past several days you ate a new ration. We are interested in your honest reactions to these foods. Your responses to these questions are important to the future development of this ration and are strictly confidential.

1. How long have you been in the Armed Forces? _____years _____months

2. What is your rank? _____

3. Which of the following three groups did you belong to during the exercise? Check one.

_____ Command & Control _____ Radio _____ Reconnaissance

4. Please use the following scale to indicate how much you liked or disliked each of the items in the ration you ate by circling the number that best expresses your opinion. If you never tried a particular item, please circle the "NEVER TRIED" category and leave the rating scale blank.

NEVER TRIED	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9
ENTREE BARS									
Beef Stew	0	1	2	3	4	5	6	7	8	9
Chicken Stew	0	1	2	3	4	5	6	7	8	9
Chicken a la King	0	1	2	3	4	5	6	7	8	9
Spaghetti	0	1	2	3	4	5	6	7	8	9
Pork and Rice	0	1	2	3	4	5	6	7	8	9
Chili	0	1	2	3	4	5	6	7	8	9
CRISPY BREAD									
Nacho-Cheese	0	1	2	3	4	5	6	7	8	9
Bacon-Cheese	0	1	2	3	4	5	6	7	8	9
Pizza	0	1	2	3	4	5	6	7	8	9
Apple	0	1	2	3	4	5	6	7	8	9
Tamale	0	1	2	3	4	5	6	7	8	9
Orange Nut	0	1	2	3	4	5	6	7	8	9

NEVER TRIED	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9
CEREAL BARS									
Granola	0	1	2	3	4	5	6	7	8	9
Oatmeal	0	1	2	3	4	5	6	7	8	9
Life	0	1	2	3	4	5	6	7	8	9
Shredded Wheat	0	1	2	3	4	5	6	7	8	9
Wheat Chex	0	1	2	3	4	5	6	7	8	9
Grapenuts	0	1	2	3	4	5	6	7	8	9
DESSERT BARS									
Graham	0	1	2	3	4	5	6	7	8	9
Apple-Cinnamon	0	1	2	3	4	5	6	7	8	9
Blueberry	0	1	2	3	4	5	6	7	8	9
Pecan	0	1	2	3	4	5	6	7	8	9
Chocolate Chip	0	1	2	3	4	5	6	7	8	9
FRUIT POCKETS									
Apple	0	1	2	3	4	5	6	7	8	9
Apricot	0	1	2	3	4	5	6	7	8	9
Grape	0	1	2	3	4	5	6	7	8	9
Raspberry	0	1	2	3	4	5	6	7	8	9
Cherry	0	1	2	3	4	5	6	7	8	9
Strawberry	0	1	2	3	4	5	6	7	8	9

NEVER TRIED	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9
DAIRY BARS									
Orange-pineapple-coconut	0	1	2	3	4	5	6	7	8	9
Mixed nuts	0	1	2	3	4	5	6	7	8	9
Almond	0	1	2	3	4	5	6	7	8	9
Strawberry	0	1	2	3	4	5	6	7	8	9
Banana	0	1	2	3	4	5	6	7	8	9
Orange-Pineapple	0	1	2	3	4	5	6	7	8	9
FRUIT BEVERAGE BARS									
Lemon-Lime	0	1	2	3	4	5	6	7	8	9
Orange	0	1	2	3	4	5	6	7	8	9
Lemon Tea	0	1	2	3	4	5	6	7	8	9
Raspberry	0	1	2	3	4	5	6	7	8	9
Strawberry	0	1	2	3	4	5	6	7	8	9
Cherry	0	1	2	3	4	5	6	7	8	9
Grape	0	1	2	3	4	5	6	7	8	9
Tropical Punch	0	1	2	3	4	5	6	7	8	9
Lemonade	0	1	2	3	4	5	6	7	8	9
BEEF JERKY	0	1	2	3	4	5	6	7	8	9
COCOA BEVERAGE BARS	0	1	2	3	4	5	6	7	8	9

5. Overall, do you feel that this ration had a positive (good) or negative (bad) effect on your mission performance?

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EXTREMELY POSITIVE EFFECT	MODERATELY POSITIVE EFFECT	SLIGHTLY POSITIVE EFFECT	NO EFFECT EITHER WAY	SLIGHTLY NEGATIVE EFFECT
1	2	3	4	5

MODERATELY NEGATIVE EFFECT	EXTREMELY NEGATIVE EFFECT
6	7

6. If you responded with either a 1,2,3, or 4 to Question 5 above, answer this question. If you responded with either a 5,6, or 7 to Question 5, skip this question and go to Question 7.

If you had only this ration to eat, how many more days would you have been able to eat it without it adversely affecting your mission performance? Circle one number.

1 2 3 5 7 15 30 45 60 days

7. If changes were to be made to the rations that you ate on this mission, what characteristic of the ration would you most want to see changed?*

a. that the ration be lighter ____

b. that the ration take up less space ____

c. that the ration packages be easier to open ____

d. that the ration have fewer bars that need to be rehydrated ____

e. that the ration bars rehydrate faster in water ____

f. that the ration make you less thirsty ____

g. that the ration taste better ____

h. that the ration have more variety of bars ____

i. that the ration be more filling ____

j. that the ration not crumble as much ____

k. that more dried meat be added ____

*Please identify the five most important changes by placing a "1" next to the most important change, a "2" next to the second most important, and so on for the third, fourth and fifth most important changes.

8. If you could design your own daily ration using the same types of bars as you had available and the same total number, (eleven), how many of each type of bar would you want per day? Remember, total number must equal eleven (11).

a.	Entree bars	____
b.	Crispy bread bars	____
c.	Dairy bars	____
d.	Fruit beverage bars	____
e.	Dessert bars	____
f.	Cereal bars	____
g.	Fruit pockets	____
h.	Cocoa beverage bars	____
i.	Beef jerky	____
	Total	11

9. We would like to know how satisfied you were with the variety in each part of the ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

	ENOUGH VARIETY	SHOULD HAVE SOMEWHAT MORE VARIETY	SHOULD HAVE MODERATELY MORE VARIETY	SHOULD HAVE MUCH MORE VARIETY
	1	2	3	4
a.	Entree bars	1	2	3	4
b.	Crispy bread bars	1	2	3	4
c.	Dairy bars	1	2	3	4
d.	Fruit beverage bars	1	2	3	4
e.	Dessert bars	1	2	3	4
f.	Cereal bars	1	2	3	4
g.	Fruit bars	1	2	3	4
h.	Cocoa beverage bars	1	2	3	4

PLEASE TURN PAGE OVER

10. How often did you have enough water available to rehydrate (mix with water) the food items that you wanted to rehydrate? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

11. How often was the amount of water you brought into the field enough to satisfy your thirst? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

12. Were you resupplied with water during the exercise? Please circle one. YES NO

13. Did you obtain additional pick-up water? Please circle one. YES NO

14. If you did obtain pick-up water, did you use iodine tablets to disinfect the water? Please circle one. YES NO

15. On the average, how many quarts of water did you use each day for drinking and eating? Please circle one number.

0	1/4	1/2	3/4	1	1 1/2	2	2 1/2	3	3 1/2	4

16. How often did you rehydrate (mix with water) the dehydrated (dry) components of your ration? Please circle one response for each component.

	NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
a. Entree bars	1	2	3	4	5
b. Dairy bar	1	2	3	4	5
c. Fruit beverage bars	1	2	3	4	5
d. Cereal bars	1	2	3	4	5

17. What were your reasons for NOT REHYDRATING (mixing with water) the dehydrated (dry) components of your ration? Circle ALL the reasons that apply to you. If you ALWAY added water to your dry components, circle "g" only.

a. Dehydrated foods tasted better dry (which ones?_____)

b. Dehydrated foods had better texture dry (which ones?_____)

c. Not enough water available for mixing

d. Too much trouble to mix with water

e. Not enough time to mix with water

f. Other reasons (such as:_____)

g. Always added water to my dehydrated (dry) rations

18. How often did you use HOT water to mix with the dehydrated (dry) entree bars of your ration? Please circle one number.

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THAN TIME	ALWAYS
1	2	3	4	5

19. What were your reasons for NOT using HOT water to rehydrate your entree bars? Circle ALL the reasons that apply to you. If you ALWAYS used hot water, circle "h" only.

a. Entree bars tasted better with cold water (which ones?_____)

b. Entree bars had better texture with cold water (which ones?_____)

c. Not enough water available for rehydrating

d. No equipment available for heating

e. Too much trouble to heat water

f. Not enough time to heat water

g. Other reasons (such as:_____)

h. Alwasy heated my entree bars

20. For what reasons did you NOT eat enough during the exercise? Circle ALL the reasons that apply to you. If you ALWAYS ate enough during the exercise, circle "j" only.

a. Disliked the rations

b. Not enough rations

c. Not enough time to prepare rations

d. Too much trouble to prepare rations

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e. Not enough time to eat

f. Too cold to stop and eat

g. Too tired to eat

h. Too dark to eat

i. Other

j. Always ate enough during this excercise

21. Overall, did you get enough to eat or were you hungry? Circle one number.

1 - Got enough to eat

2 - Was sometimes hungry

3 - Was often hungry

4 - Was almost always hungry

22. Overall, how CONVENIENT (easy) was the ration to use in the field? Please circle one number.

EXTREMELY CONVENIENT	MODERATELY CONVENIENT	SLIGHTLY CONVENIENT	NEUTRAL	SLIGHTLY INCONVENIENT	MODERATELY INCONVENIENT	EXTREMELY INCONVENIENT
1	2	3	4	5	6	7

23. Please list the most convenient aspects of the ration._____

_____

24. Please list the most inconvenient aspects of the ration._____

_____

25. For each of the item in the accessory packet, please indicate whether you needed more of the item, less of the item, or had just the right amount. If you needed either more or less, please write in how many MORE or LESS you would have wanted.

	NEEDED MORE (write in number)	NEEDED LESS (write in number)	JUST THE RIGHT AMOUNT (place check mark)
a. Toilet paper	_____	_____	_____
b. Spoons	_____	_____	_____
c. Matches	_____	_____	_____
d. Sugar	_____	_____	_____
e. Cream	_____	_____	_____
f. Coffee (crystals)	_____	_____	_____

26. Is there anything else you would like to see added to the accessory packet? If so, what?

27. Use the following scale to indicate how much you feel that eating your daily ration serves as a source of diversion/entertainment to break up the day, or as a way to kill time when not performing mision duties. Please circle one.

UNNECESSARY DIVERSION	USEFUL DIVERSION	NECESSARY DIVERSION

28. What are the MOST IMPORTANT factors in a combat ration for a mission such as the one you were on? Please rank the factors below by placing a "1" next to the most important factor, and "2" next to the second most important factor, and so on for the third, fourth and fifth factors.

a. Light weight _____

b. Takes up little space _____

c. Tastes good _____

d. Stops my hunger _____

e. Gives me enough energy to do my job _____

29. Please rate the ration that you ate on this mission on each of the factors below by circling a number from the scale.

	EXCELLENT	GOOD	FAIR	POOR
a. Light weight	1	2	3	4
b. Takes up little space	1	2	3	4
c. Tastes good	1	2	3	4
d. Stops my hunger	1	2	3	4
e. Gives me enough energy to do my job	1	2	3	4

30. What privately purchased foods, if any, do you like to bring with you on a field exercise such as this?

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31. What components from other rations do you choose to bring with you on a field exercise such as this (if any)?

32. Are there any foods or drinks you would like added to the ration you used during this exercise?

33. Are there any foods or drinks you would like dropped or replaced?

34. Do you have any other comments on the ration?

FOOD PACKET ASSAULT QUESTIONNAIRE

Behavioral Sciences Division
U.S. Army Natick Research & Development Center
Natick, Massachusetts 01760-5020

During the past several days you ate the Food Packet Assault. We are interested in your honest reactions to these foods. Your response to these questions are important to the development of new rations and are strictly confidential.

1. How long have you been in the Armed Forces? _____years _____months

2. What is your rank? _____

3. Which of the following three groups did you belong to during this exercise?
Check one: _____ Command & Control _____ Radio _____ Reconnaissance

4. Please use the following scale to indicate how much you liked or disliked each of the items in the ration you ate by circling the number that best expresses your opinion. If you never tried a particular item, please circle the "NEVER TRIED" category and leave the rating scale blank.

	NEVER TRIED	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
	0	1	2	3	4	5	6	7	8	9
ENTREE BARS										
Beef and Vegetables	0	1	2	3	4	5	6	7	8	9
Chicken Stew	0	1	2	3	4	5	6	7	8	9
Chicken & Rice	0	1	2	3	4	5	6	7	8	9
Chicken a la King	0	1	2	3	4	5	6	7	8	9
Spaghetti & Meat Sauce	0	1	2	3	4	5	6	7	8	9
Pork w/Scalloped Potatoes	0	1	2	3	4	5	6	7	8	9
DESSERT BARS										
Oatmeal Cookie	0	1	2	3	4	5	6	7	8	9
Granola	0	1	2	3	4	5	6	7	8	9
Fig	0	1	2	3	4	5	6	7	8	9
Chocolate/Fudge	0	1	2	3	4	5	6	7	8	9

	NEVER TRIED	DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
	0	1	2	3	4	5	6	7	8	9
Chocolate Pudding					0	1	2	3	4	5	6	7	8	9
Vanilla Pudding					0	1	2	3	4	5	6	7	8	9
ORANGE BEVERAGE BAR					0	1	2	3	4	5	6	7	8	9
BEEF JERKY					0	1	2	3	4	5	6	7	8	9
PEPPERONI					0	1	2	3	4	5	6	7	8	9

5. Overall, do you feel that this ration had a positive (good) or negative (bad) effect on your mission performance?

EXTREMELY POSITIVE EFFECT	MODERATELY POSITIVE EFFECT	SLIGHTLY POSITIVE EFFECT	NO EFFECT EITHER WAY	SLIGHTLY NEGATIVE EFFECT	MODERATELY NEGATIVE EFFECT	EXTREMELY NEGATIVE EFFECT
1	2	3	4	5	6	7

6. If you responded with either a 1, 2, 3 or 4 to question 5 above, answer this question. If you responded with either a 5, 6 or 7, skip this question and go to question 7.

If you had only this ration to eat on an extended mission, how many more days would you have been able to eat it without it adversely affecting your mission performance? Circle one number.

1 2 3 5 7 15 30 45 60 days

7. If changes were to be made to the rations that you ate on this mission, what characteristics of the ration would you most want to see changed? Please identify the <u>five</u> most important changes by placing a "1" next to the <u>most</u> important change, a "2" next to the second most important, and so on for the third, fourth and fifth most important changes.

a. that the ration be lighter _____

b. that the ration take up less space _____

c. that the ration packages be easier to open _____

d. that the ration have fewer bars that need to be rehydrated _____

e. that the ration bars rehydrate faster in water _____

f. that the ration make you less thirsty _____

g. that the ration taste better _____

h. that the ration have more variety of bars _____

i. that the ration be more filling _____

j. that the ration not crumble as much _____

k. that more dried meat be added _____

8. If you could design your own daily ration using the same types of bars as you had available and the same total number (eleven) how many of each type of bar would you want per day. Remember, the total number must equal eleven (11).

a. Entree bars _____

b. Granola bars _____

c. Oatmeal cookie bars _____

d. Chocolate/Fudge bars _____

e. Pudding bars _____

f. Orange Beverage bars _____

g. Fig bars _____

h. Beef jerky/Pepperoni _____

Total = 11

9. We would like to know how satisfied you were with the variety in each part of the ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

	ENOUGH VARIETY	SHOULD HAVE SOMEWHAT MORE VARIETY	SHOULD HAVE MODERATELY MORE VARIETY	SHOULD HAVE MUCH MORE VARIETY
	1	2	3	4
a. Entree bars	1	2	3	4
b. Granola/Oatmeal bars	1	2	3	4
c. Chocolate/Fudge bars	1	2	3	4
d. Pudding bars	1	2	3	4
e. Beverage bars	1	2	3	4
f. Fig/Fruit bars	1	2	3	4
g. Dried meats	1	2	3	4

PLEASE TURN PAGE OVER

10. How often did you have enough water available to rehydrate the food items that you wanted to rehydrate? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

11. How often was the amount of water you brought into the field enough to satisfy your thirst? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

12. Were you resupplied with water during the excercise? Please circle one. YES NO

13. Did you obtain additional pick-up water? Please circle one. YES NO

14. If you did obtain pick-up water, did you use iodine tablets to disinfect the water? Please circle one. YES NO

15. On the average, how many quarts of water did you use each day for drinking and eating? Please circle one number.

0	1/4	1/2	3/4	1	1½	2	2½	3	3½	4

16. How often did you rehydrate (mix with water) the dehydrated (dry) components of your ration? Please circle one response for each component.

	NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
a. Entree bars	1	2	3	4	5
b. Pudding bars	1	2	3	4	5
c. Beverage bars	1	2	3	4	5

17. What were your reasons for NOT REHYDRATING (mixing with water) the dehydrated (dry) components of your ration? Circle ALL the reasons that apply to you. If you ALWAYS added water to your dry components, circle "g" only.

a. Dehyrated foods tasted better dry (which ones?_____)

b. Dehydrated foods had better texture dry (which ones?_____)

c. Not enough water available for mixing

d. Too much trouble to mix with water

e. Not enough time to mix with water

f. Other reasons (such as:_____)

g. Always added water to my dehydrated (dry) rations

18. How often did you use HOT water to mix with the dehydrated (dry) entree bars of your ration? Please circle one number.

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

19. What were your reasons for NOT using HOT water to rehydrate your entree bars? Circle ALL the reasons that apply to you. If you ALWAYS used hot water, circle "h" only.

a. Entree bars tasted better with cold water (which ones?_____)

b. Entree bars had better texture with cold water (which ones?_____)

c. Not enough water available for rehydrating

d. No equipment available for heating

e. Too much trouble to heat water

f. Not enough time to heat water

g. Other reasons (such as:_____)

h. Always heated my entree bars

20. For what reasons did you NOT eat enough during this exercise? Circle ALL the reasons that apply to you. If you ALWAYS ate enough during this exercise, circle "j" only.

a. Disliked the rations

b. Not enough rations

c. Not enough time to prepare rations

d. Too much trouble to prepare rations

e. Not enough time to eat

f. Too cold to stop and eat

g. Too tired to eat

PLEASE TURN PAGE OVER

h. Too dark to eat

i. Other

j. Always ate enough during this exercise

21. Overall, did you get enough to eat or were you hungry? Circle one number.

1 - Got enough to eat

2 - Was sometimes hungry

3 - Was often hungry

4 - Was almost always hungry

22. Overall, how CONVENIENT (easy) was the ration to use in the field? Please circle one number.

EXTREMELY CONVENIENT	MODERATELY CONVENIENT	SLIGHTLY CONVENIENT	NEUTRAL	SLIGHTLY INCONVENIENT	MODERATELY INCONVENIENT	EXTREMELY INCONVENIENT
1	2	3	4	5	6	7

23. Please list the most convenient aspects of the ration. _____

_____

24. Please list the most inconvenient aspects of the ration._____

_____

25. For each of the accessory items, please indicate whether you needed more of the item, less of the item, or had just the right amount. If you needed either more or less, please write in how many MORE or LESS you would have wanted.

	NEEDED MORE (write in number)	NEEDED LESS (write in number)	JUST THE RIGHT AMOUNT (place check mark)
a. Toilet paper	_____	_____	_____
b. Spoons	_____	_____	_____
c. Matches	_____	_____	_____
d. Sugar	_____	_____	_____
e. Salt	_____	_____	_____
f. Cream	_____	_____	_____
g. Chewing gum	_____	_____	_____
h. Coffee	_____	_____	_____

26. Is there anything else you would like to see added as accessories? If so, what?

Appendix B

RLW-30

Daily Ration Log Book

Results

For Ration items numbered B-1 through B-9, the following rating scale was used:

DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE
1	2	3	4	5

LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
6	7	8	9

TABLE B-1 Entree Bars

Day	Mean Rating	SD	N
1	7.31	1.72	26
2	7.31	1.26	26
3	7.62	0.98	26
4	7.08	1.87	25
5	7.18	2.00	28
6	7.14	1.74	28
7	7.77	1.07	26
8	7.37	1.15	27
9	7.50	1.20	28
10	7.42	1.50	26
11	7.44	1.58	27
12	7.65	1.15	23
13	8.14	0.69	7
14	8.50	0.71	2
GRAND	7.42	1.46	325

TABLE B-2 Crispy Bread Bars

Day	Mean Rating	SD	N
1	5.80	2.60	25
2	6.96	1.83	27
3	6.93	1.80	28
4	6.79	1.75	28
5	6.63	1.86	27
6	6.22	1.74	27
7	6.73	1.85	26
8	6.78	1.40	27
9	7.00	1.83	26
10	7.00	1.65	26
11	6.59	1.65	27
12	6.79	1.98	24
13	6.57	1.27	7
14	8.00	0.00	1
GRAND	6.69	1.83	326

TABLE B-3 Dairy Bars

Day	Mean Rating	SD	N
1	5.44	2.41	27
2	6.23	2.55	26
3	6.79	2.36	24
4	6.27	2.31	26
5	6.63	2.32	24
6	6.23	2.23	26
7	6.42	1.92	26
8	6.56	1.92	25
9	6.79	2.04	24
10	6.65	2.17	23
11	6.79	2.13	24
12	6.67	2.22	21
13	6.17	2.71	6
14	8.00	0.00	1
GRAND	6.44	2.23	303

TABLE B-4 Cereal Bars

Day	Mean Rating	SD	N
1	7.15	1.79	27
2	7.36	1.89	28
3	7.46	2.12	28
4	7.30	2.07	27
5	7.32	2.00	28
6	7.17	2.17	29
7	7.36	2.13	28
8	7.18	2.14	28
9	7.32	2.13	28
10	7.18	2.21	28
11	7.36	2.13	28
12	7.38	2.25	21
13	7.14	1.68	7
14	9.00	0.00	1
GRAND	7.29	2.08	336

TABLE B-5 Dessert Bars

Day	Mean Rating	SD	N
1	7.33	1.90	27
2	7.39	1.85	28
3	7.63	1.08	27
4	7.54	1.32	28
5	7.56	1.63	27
6	7.17	1.91	29
7	7.79	1.05	29
8	7.50	1.60	28
9	7.82	1.06	28
10	7.46	1.50	28
11	7.52	1.70	27
12	7.74	1.79	23
13	7.33	1.37	6
14	8.00	0.00	1
GRAND	7.53	1.56	336

TABLE B-6 Cocoa Beverage Bars

Day	Mean Rating	SD	N
1	5.87	2.42	23
2	6.44	1.96	25
3	6.45	1.47	22
4	6.12	1.74	25
5	6.28	1.86	25
6	6.19	1.91	21
7	6.27	1.96	22
8	6.42	1.86	24
9	6.44	1.87	25
10	6.44	1.78	25
11	6.12	1.94	25
12	6.23	2.09	22
13	6.43	2.51	7
14	7.00	0.00	1
GRAND	6.28	1.93	292

TABLE B-7 Fruit Beverage Bars

Day	Mean Rating	SD	N
1	7.59	1.21	29
2	7.74	0.98	27
3	7.71	1.65	28
4	7.66	1.70	29
5	7.62	1.63	29
6	7.50	2.03	28
7	7.57	1.69	28
8	7.63	1.64	27
9	7.63	1.69	27
10	7.63	1.71	27
11	7.59	1.67	27
12	7.67	1.66	24
13	7.57	1.27	7
14	9.00	0.00	1
GRAND	7.63	1.62	338

TABLE B-8 Fruit Pockets

Day	Mean Rating	SD	N
1	6.96	2.17	28
2	7.29	1.94	28
3	7.56	1.89	27
4	7.45	2.05	29
5	7.34	1.93	29
6	7.28	2.02	29
7	7.74	1.48	27
8	7.69	1.49	26
9	7.81	1.50	26
10	7.65	1.57	26
11	7.54	1.61	26
12	7.78	1.54	23
13	8.33	0.82	6
14	9.00	0.00	1
GRAND	7.52	1.78	331

TABLE B-9 Beef Jerky

Day	Mean Rating	SD	N
1	7.43	2.07	7
2	8.29	1.50	7
3	7.71	1.98	7
4	8.00	1.77	8
5	7.86	1.86	7
6	7.86	1.86	7
7	8.00	2.00	6
8	7.00	3.46	3
9	7.40	3.05	5
10	7.60	2.61	5
11	7.40	3.05	5
12	8.67	0.58	3
13	9.00	0.00	1
14	--	--	--
GRAND	7.80	2.17	71

For ration items numbered B-10 through B-18, the amount of bars ate per day is reported.

TABLE B-10 Entree Bars

Day	Mean	SD	N
1	1.33	0.62	27
2	1.33	0.62	27
3	1.32	0.61	28
4	1.29	0.53	28
5	1.48	0.69	29
6	1.48	0.51	27
7	1.50	0.71	26
8	1.36	0.56	28
9	1.46	0.51	28
10	1.21	0.63	28
11	1.36	0.56	28
12	1.50	0.95	26
13	1.38	0.74	8
14	1.50	0.71	2
GRAND	1.39	0.64	340

TABLE B-11 Crispy Bread Bars

Day	Mean	SD	N
1	0.89	0.32	28
2	0.93	0.26	29
3	0.93	0.26	29
4	0.96	0.19	28
5	0.93	0.26	29
6	1.00	0.38	28
7	0.96	0.33	28
8	0.93	0.26	28
9	0.93	0.26	28
10	1.00	0.47	28
11	1.04	0.33	28
12	1.00	0.40	26
13	0.88	0.35	8
14	0.50	0.71	2
GRAND	0.95	0.32	347

TABLE B-12 Dairy Bars

Day	Mean	SD	N
1	0.93	0.38	28
2	0.76	0.44	29
3	0.86	0.45	28
4	0.93	0.38	28
5	0.86	0.44	29
6	0.86	0.45	28
7	1.00	0.47	28
8	0.86	0.36	28
9	0.93	0.47	28
10	0.89	0.50	28
11	0.93	0.47	28
12	0.92	0.63	26
13	0.75	0.46	8
14	0.00	0.00	2
GRAND	0.88	0.45	346

TABLE B-13 Cereal Bars

Day	Mean	SD	N
1	1.00	0.27	28
2	0.93	0.26	29
3	0.97	0.33	29
4	0.96	0.33	28
5	0.97	0.19	29
6	1.00	0.27	28
7	1.00	0.38	28
8	1.00	0.27	28
9	1.07	0.26	28
10	1.11	0.32	28
11	1.14	0.36	28
12	0.96	0.45	26
13	1.00	0.53	8
14	0.50	0.71	2
GRAND	1.01	0.32	347

TABLE B-14 Dessert Bars

Day	Mean	SD	N
1	1.04	0.33	28
2	0.93	0.37	29
3	0.97	0.19	29
4	1.07	0.26	28
5	1.00	0.27	29
6	1.04	0.19	28
7	1.07	0.26	28
8	1.04	0.19	28
9	1.00	0.00	28
10	1.00	0.00	28
11	1.07	0.38	28
12	0.96	0.53	26
13	0.75	0.46	8
14	0.50	0.71	2
GRAND	1.01	0.29	347

TABLE B-15 Cocoa Beverage Bars

Day	Mean	SD	N
1	0.78	0.51	27
2	0.86	0.58	29
3	0.72	0.65	29
4	0.89	0.57	28
5	0.90	0.62	29
6	0.70	0.61	27
7	0.79	0.57	28
8	0.93	0.54	28
9	0.86	0.45	28
10	1.11	0.69	28
11	1.04	0.51	28
12	1.08	0.63	26
13	1.00	0.58	7
14	1.00	1.41	2
GRAND	0.89	0.58	344

TABLE B-16 Fruit Beverage Bars

Day	Mean	SD	N
1	1.50	0.58	28
2	1.59	0.73	29
3	1.66	0.67	29
4	1.71	0.66	28
5	1.79	0.56	29
6	1.57	0.69	28
7	1.64	0.78	28
8	1.61	0.63	28
9	1.64	0.62	28
10	1.64	0.68	28
11	1.71	0.66	28
12	1.77	0.91	26
13	1.88	0.35	8
14	1.00	1.41	2
GRAND	1.65	0.68	347

TABLE B-17 Fruit Pockets

Day	Mean	SD	N
1	1.00	0.27	28
2	0.86	0.35	29
3	0.93	0.26	29
4	1.04	0.19	28
5	0.97	0.19	29
6	1.04	0.33	28
7	0.93	0.26	28
8	0.96	0.33	28
9	0.93	0.26	28
10	0.96	0.33	28
11	1.04	0.43	28
12	1.00	0.49	26
13	1.00	0.58	7
14	0.50	0.71	2
GRAND	0.97	0.33	346

TABLE B-18 Beef Jerky

Day	Mean	SD	N
1	1.00	0.00	1
2	1.00	0.00	1
3	1.00	0.00	1
4	1.00	0.00	1
5	1.00	0.00	1
6	1.00	0.00	1
7	1.00	0.00	1
8	1.00	0.00	1
9	1.00	0.00	1
10	1.00	0.00	1
11	1.00	0.00	1
12	--	--	--
13	--	--	--
14	--	--	--
GRAND	1.00	0.00	11

TABLE B-19 Mean Urinations per day

Day	Mean	SD	N
1	3.41	1.55	29
2	3.14	1.22	29
3	2.90	1.11	29
4	2.86	1.19	29
5	3.03	1.35	29
6	2.97	1.24	29
7	3.03	1.15	29
8	3.10	1.18	29
9	3.24	1.02	29
10	3.11	0.96	28
11	3.07	1.10	29
12	3.35	1.10	26
13	2.75	1.28	8
14	2.00	0.00	1
GRAND	3.09	1.19	353

TABLE B-20 Percentage of Urinations per day

Urination(s)/day	Percentage
0	1.4
1	5.9
2	25.6
3	28.2
4	27.6
5	9.3
6	1.4
NO RESPONSE	0.6

TABLE B-21 Mean Defecations per day

Day	Mean	SD	N
1	0.83	0.76	29
2	0.59	1.02	29
3	0.66	0.67	29
4	0.31	0.71	29
5	0.62	0.62	29
6	0.75	0.89	28
7	0.52	0.63	29
8	0.59	0.63	29
9	0.72	0.70	29
10	0.52	0.69	29
11	0.76	0.91	29
12	0.88	0.77	26
13	0.75	0.46	8
14	0.00	0.00	1
GRAND	0.64	0.75	353

TABLE B-22 Percentage of Defecations per day

Defecation(s)/day	Percentage
0	48.7
1	40.3
2	8.2
3	2.0
4	0.0
5	0.3
NO RESPONSE	0.6

For TABLES B-23 and B-24 the following scale was used:

Quarts:	0	1/4	1/2	3/4	1	1 1/2	2	2 1/2	3	3 1/2	4
	1	2	3	4	5	6	7	8	9	10	11

TABLE B-23 Mean Water Usage

Day	Mean	SD	N
1	6.69	1.83	29
2	6.55	1.55	29
3	6.62	1.29	29
4	6.38	1.40	29
5	6.86	1.27	29
6	6.90	1.66	29
7	6.93	1.76	28
8	7.00	1.63	28
9	7.21	1.32	29
10	7.17	1.42	29
11	7.24	1.81	29
12	7.73	1.82	26
13	6.75	1.67	8
14	8.00	0.00	1
GRAND	6.93	1.58	352

TABLE B-24 Percentage of Water Usage

Amount/day	Percentage
1	0.0
2	0.3
3	1.4
4	2.0
5	11.3
6	23.1
7	33.8
8	14.6
9	5.4
10	2.8
11	4.5
NO RESPONSE	0.8

Appendix C

FPA

Daily Ration Log Book

Results

For Ration items numbered C-1 through C-8, the following rating scale was used:

DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE
1	2	3	4	5

LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
6	7	8	9

TABLE C-1 Entree Bars

Day	Mean Rating	SD	N
1	6.00	2.20	15
2	6.71	1.65	17
3	6.50	2.34	16
4	6.79	1.93	14
5	6.67	1.85	18
6	6.76	2.14	17
7	6.75	1.73	16
8	6.47	1.97	17
9	6.82	1.67	17
10	7.00	1.85	15
11	6.50	1.71	16
12	6.79	1.93	14
13	6.00	2.83	2
14	7.00	0.00	1
GRAND	6.64	1.93	195

TABLE C-2 Granola Bars

Day	Mean Rating	SD	N
1	7.13	1.50	16
2	6.65	2.03	17
3	6.67	2.08	17
4	6.44	2.58	16
5	6.50	2.50	18
6	6.82	2.48	17
7	6.69	2.27	16
8	5.94	2.59	17
9	6.13	2.75	15
10	6.63	2.33	16
11	6.18	2.70	17
12	6.43	2.31	14
13	9.00	0.00	1
14	9.00	0.00	1
GRAND	6.55	2.37	198

TABLE C-3 Oatmeal Cookie Bars

Day	Mean Rating	SD	N
1	8.06	1.53	16
2	7.71	1.93	17
3	7.89	1.71	18
4	8.07	1.67	15
5	8.00	1.65	18
6	7.83	1.76	18
7	8.25	1.61	16
8	8.17	1.54	18
9	8.06	1.73	16
10	8.22	1.63	18
11	8.17	1.62	18
12	8.36	1.65	14
13	9.00	0.00	1
14	9.00	0.00	1
GRAND	8.07	1.67	204

TABLE C-4 Chocolate/Fudge Bars

Day	Mean Rating	SD	N
1	3.71	2.13	14
2	4.83	2.12	12
3	5.07	2.43	14
4	5.14	2.45	14
5	4.93	2.55	15
6	5.60	2.23	15
7	4.67	2.55	15
8	5.00	2.10	16
9	5.07	2.66	15
10	5.75	2.38	16
11	5.53	2.53	17
12	5.43	2.28	14
13	1.00	0.00	1
14	4.00	0.00	1
GRAND	5.05	2.38	179

TABLE C-5 Pudding Bars

Day	Mean Rating	SD	N
1	5.33	1.87	12
2	6.33	2.00	9
3	4.33	3.06	3
4	5.86	2.61	7
5	6.00	2.83	6
6	6.86	2.97	7
7	4.67	3.20	6
8	6.00	2.88	8
9	5.67	2.73	6
10	6.00	2.78	9
11	5.43	3.26	7
12	6.00	2.92	5
13	5.00	0.00	1
14	--	--	--
GRAND	5.77	2.69	86

TABLE C-6 Beverage Bars

Day	Mean Rating	SD	N
1	7.00	1.84	14
2	6.94	1.92	17
3	7.00	2.07	16
4	7.81	1.33	16
5	7.44	1.59	16
6	7.47	1.50	17
7	7.47	1.28	17
8	7.50	1.50	18
9	7.75	1.39	16
10	7.67	1.50	15
11	7.50	1.63	16
12	7.53	1.55	15
13	9.00	0.00	1
14	9.00	0.00	1
GRAND	7.44	1.61	195

TABLE C-7 Fig Bars

Day	Mean Rating	SD	N
1	7.13	2.64	8
2	8.31	0.85	13
3	8.13	1.41	15
4	8.47	0.83	15
5	8.07	1.22	15
6	8.35	1.22	17
7	8.27	1.19	11
8	8.31	0.95	13
9	8.50	0.73	16
10	8.43	0.76	14
11	8.57	0.65	14
12	8.69	0.63	13
13	--	--	--
14	--	--	--
GRAND	8.31	1.12	164

TABLE C-8 Beef Jerky/Pepperoni

Day	Mean Rating	SD	N
1	7.82	1.24	17
2	8.13	1.06	15
3	8.00	1.19	18
4	8.19	0.91	16
5	8.31	0.95	16
6	7.72	1.74	18
7	8.18	0.95	17
8	8.44	0.96	18
9	8.47	0.72	17
10	8.17	1.04	18
11	8.24	1.09	17
12	8.27	0.88	15
13	9.00	0.00	1
14	9.00	0.00	1
GRAND	8.17	1.09	204

For ration items numbered C-9 through C-16, the amount of bars ate per day is reported.

TABLE C-9 Entree Bars

Day	Mean	SD	N
1	1.93	1.22	15
2	2.25	1.06	16
3	2.00	1.17	17
4	1.88	1.20	16
5	2.28	1.02	18
6	2.00	1.24	18
7	2.25	1.06	16
8	2.22	1.17	18
9	2.28	1.07	18
10	2.06	1.26	18
11	2.24	1.09	17
12	2.47	1.13	15
13	3.00	0.00	2
14	3.00	0.00	1
GRAND	2.17	1.14	205

TABLE C-10 Granola Bars

Day	Mean	SD	N
1	0.94	0.24	17
2	1.06	0.24	17
3	1.06	0.24	17
4	1.00	0.35	17
5	1.06	0.24	18
6	0.94	0.24	18
7	0.94	0.25	16
8	0.89	0.32	18
9	0.76	0.44	17
10	0.89	0.32	18
11	0.94	0.24	17
12	1.00	0.39	15
13	1.00	0.00	1
14	1.00	0.00	1
GRAND	0.96	0.30	207

TABLE C-11 Oatmeal Cookie Bars

Day	Mean	SD	N
1	0.94	0.24	17
2	1.06	0.24	17
3	1.06	0.24	18
4	0.94	0.43	17
5	1.06	0.24	18
6	1.00	0.00	18
7	0.94	0.24	17
8	1.00	0.00	18
9	0.94	0.24	17
10	1.00	0.00	18
11	1.00	0.00	18
12	1.00	0.38	15
13	1.00	0.00	1
14	1.00	0.00	1
GRAND	1.00	0.23	210

TABLE C-12 Chocolate/Fudge Bars

Day	Mean	SD	N
1	1.06	0.83	17
2	1.07	0.59	15
3	1.13	0.64	15
4	1.19	0.54	16
5	1.12	0.70	17
6	1.13	0.62	16
7	1.06	0.57	16
8	1.13	0.62	16
9	1.12	0.70	17
10	0.94	0.54	18
11	1.17	0.51	18
12	1.00	0.38	15
13	2.00	0.00	1
14	1.00	0.00	1
GRAND	1.10	0.61	198

TABLE C-13 Pudding Bars

Day	Mean	SD	N
1	0.86	0.36	14
2	0.50	0.65	14
3	0.23	0.44	13
4	0.62	0.51	13
5	0.31	0.48	13
6	0.43	0.51	14
7	0.45	0.52	11
8	0.67	0.49	12
9	0.43	0.51	14
10	0.60	0.51	15
11	0.58	0.51	12
12	0.45	0.52	11
13	1.00	0.00	1
14	--	--	--
GRAND	0.52	0.51	157

TABLE C-14 Beverage Bars

Day	Mean	SD	N
1	0.94	0.25	16
2	0.94	0.54	18
3	0.88	0.33	17
4	1.00	0.00	16
5	1.00	0.00	17
6	1.06	0.25	16
7	1.06	0.24	17
8	1.00	0.00	18
9	0.94	0.25	16
10	0.89	0.32	18
11	0.94	0.24	17
12	1.00	0.00	15
13	1.00	0.00	1
14	1.00	0.00	1
GRAND	0.97	0.26	203

TABLE C-15 Fig Bars

Day	Mean	SD	N
1	0.62	0.65	13
2	1.31	0.75	13
3	1.44	0.89	16
4	1.44	0.63	16
5	1.31	0.60	16
6	1.39	0.61	18
7	1.08	0.76	13
8	1.13	0.72	16
9	1.35	0.61	17
10	1.18	0.64	17
11	1.31	0.70	16
12	1.53	0.99	15
13	--	--	--
14	--	--	--
GRAND	1.27	0.72	186

TABLE C-16 Beef Jerky/Pepperoni

Day	Mean	SD	N
1	1.00	0.27	28
2	0.86	0.35	29
3	0.93	0.26	29
4	1.04	0.19	28
5	0.97	0.19	29
6	1.04	0.33	28
7	0.93	0.26	28
8	0.96	0.33	28
9	0.93	0.26	28
10	0.96	0.33	28
11	1.04	0.43	28
12	1.00	0.49	26
13	1.00	0.58	7
14	0.50	0.71	2
GRAND	0.97	0.33	346

TABLE C-17 Mean Urinations per day

Day	Mean	SD	N
1	2.76	0.90	17
2	2.78	1.44	18
3	2.94	1.20	17
4	2.56	1.46	18
5	2.72	1.32	18
6	2.78	0.94	18
7	2.67	1.14	18
8	2.67	1.14	18
9	2.67	1.19	18
10	3.11	0.90	18
11	3.18	0.95	17
12	2.86	0.86	14
13	3.00	0.00	2
14	3.00	0.00	1
GRAND	2.81	1.14	212

TABLE C-18 Percentage of Urinations per day

Urination(s)/day	Percentage
0	1.4
1	9.3
2	27.3
3	37.0
4	16.7
5	5.1
6	1.4
NO RESPONSE	1.9

TABLE C-19 Mean Defecations per day

Day	Mean	SD	N
1	0.61	0.70	18
2	0.28	0.46	18
3	0.24	0.56	17
4	0.44	0.62	18
5	0.56	0.62	18
6	0.25	0.45	16
7	0.39	0.50	18
8	0.22	0.43	18
9	0.28	0.46	18
10	0.39	0.70	18
11	0.53	0.62	17
12	0.93	0.62	14
13	0.00	0.00	2
14	0.00	0.00	1
GRAND	0.41	0.57	211

TABLE C-20 Percentage of Defecations per day

Defecation(s)/day	Percentage
0	62.0
1	31.0
2	4.6
NO RESPONSE	2.3

For TABLES C-21 and C-22 the following scale was used:

Quarts:	0	1/4	1/2	3/4	1	1 1/2	2	2 1/2	3	3 1/2	4
	1	2	3	4	5	6	7	8	9	10	11

TABLE C-21 Mean Water Usage

Day	Mean	SD	N
1	6.17	2.33	18
2	6.78	1.90	18
3	6.65	1.66	17
4	6.67	1.91	18
5	6.50	1.76	18
6	6.88	1.90	17
7	6.65	1.80	17
8	6.89	1.84	18
9	6.44	1.72	18
10	7.00	1.88	18
11	6.88	1.50	17
12	7.00	2.57	14
13	9.00	0.00	2
14	9.00	0.00	1
GRAND	6.73	1.90	211

TABLE C-22 Percentage of Water Usage

Amount/day	Percentage
1	0.0
2	0.9
3	1.9
4	5.1
5	22.2
6	12.5
7	25.5
8	13.4
9	7.9
10	4.2
11	4.2
NO RESPONSE	2.3

Appendix D

RLW-30

POSTTEST QUESTIONNAIRE

RESULTS

TABLE D-1 Time in the Armed Forces/Months

Mean	44.58
SD	31.18

TABLE D-2 Rank	Percentage
Private	3.0
Private First Class	33.3
Specialist-4	18.2
Corporal	12.1
Buck Sergeant	24.2
Staff Sergeant	6.1
First Lieutenant	3.0

TABLE D-3 Group	Percentage
Command and Control	32.3
Radio	9.7
Reconnaissance	54.8

TABLE D-4 Please use the following scale to indicate how much you liked or disliked each of the items in the ration you ate by circling the number that best expresses your opinion.

DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	*NEITHER* LIKE NOR DISLIKE
1	2	3	4	5

LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
6	7	8	9

		MEAN	SD
ENTREE BARS:	Beef Stew	6.53	1.71
	Chicken Stew	7.03	1.63
	Chicken ala King	7.18	1.53
	Spaghetti	7.30	1.53
	Pork and Rice	7.45	1.20
	Chili	5.82	2.63
CRISPY BREAD:	Nacho Cheese	6.03	2.60
	Bacon Cheese	6.85	2.03
	Pizza	6.94	2.16
	Apple	6.12	2.06
	Tamale	6.94	1.97
	Orange Nut	5.81	2.18

		MEAN	SD
CEREAL BARS:	Granola	7.18	1.96
	Oatmeal	7.29	1.96
	Life	7.27	1.99
	Shredded Wheat	7.24	1.96
	Wheat Chex	7.30	1.98
	Grapenuts	7.06	2.26
DESSERTS:	Graham	7.29	1.66
	Apple Cinnamon	7.35	1.18
	Blueberry	7.32	1.74
	Pecan	6.65	2.16
	Chocolate Chip	7.03	2.04
FRUIT POCKETS:	Apple	7.36	1.97
	Apricot	7.06	2.09
	Grape	7.48	1.97
	Raspberry	7.33	2.16
	Cherry	7.39	2.08
	Strawberry	7.35	2.19
DAIRY BARS:	Orange-Pineapple-Coconut	6.00	2.74
	Mixed Nut	6.06	2.55
	Almond	6.25	2.48
	Strawberry	6.33	2.55
	Banana	6.74	2.41
	Orange-Pineapple	6.09	2.82
FRUIT BEV BARS:	Lemon-Lime	7.21	1.73
	Orange	7.41	1.46
	Lemon Tea	6.15	2.66
	Raspberry	7.70	1.21
	Strawberry	7.79	1.10
	Cherry	7.65	1.30
	Grape	7.68	1.32
	Tropical Punch	7.82	1.27
	Lemonade	7.42	1.58
BEEF JERKY		7.94	1.54
COCOA BEVERAGE BARS		5.94	2.12

TABLE D-5 Overall, do you feel that this ration had a positive (good) or negative (bad) effect on your mission performance?

Extremely Positive Effect	Moderately Positive Effect	Slightly Positive Effect	No Effect Either Way
1	2	3	4

Slightly Negative Effect	Moderately Negative Effect	Extremely Negative Effect
5	6	7

Mean ----- 4.48
SD ----- 1.34

TABLE D-6 If you had only this ration to eat, how many days would you have been able to eat it without it adversely affecting your mission performance?

Mean ----- 14.64
SD ----- 10.81

TABLE D-7 If changes were to be made to the rations that you ate on this mission, what characteristic of the ration would you most want to see changed? Please identify the five most important changes by placing a "1" next to the most important change, a "2" next to the second most important and so forth

PERCENTAGE OF IMPORTANCE

CHANGES	1st	2nd	3rd	4th	5th	6th	7th
Be lighter	--	2.9	5.9	2.9	2.9	--	2.9
Take up less space	--	2.9	2.9	--	8.8	2.9	--
Easier to open	--	2.9	--	11.8	5.9	--	--
Less rehydrating	5.9	8.8	23.5	8.8	5.9	--	--
Rehydrate faster	2.9	5.9	11.8	8.8	5.9	2.9	--
Less thirst	2.9	20.6	5.9	--	11.8	--	--
Taste better	8.8	2.9	8.8	5.9	2.9	--	--
More variety	2.9	5.9	2.9	8.8	5.9	--	2.9
More filling	61.8	14.7	5.9	--	--	--	--
Not crumble	--	--	5.9	--	--	--	--
More dried meat	17.6	23.5	14.7	8.8	2.9	--	--

PERCENTAGE OF IMPORTANCE (cont)

	8th	9th	UNRANKED MEAN	SD
Be lighter	--	2.9	79.4	4.71	2.50
Take up less space	--	2.9	79.4	5.00	2.24
Easier to open	2.9	2.9	73.5	5.00	2.18
Less rehydrating	--	--	47.1	3.00	1.14
Rehydrate faster	--	2.9	58.8	3.86	1.99
Less thirst	--	--	58.8	2.93	1.44
Taste better	--	--	70.5	2.70	1.42
More variety	--	2.9	67.6	4.18	2.32
More filling	--	--	17.6	1.32	0.61
Not crumble	2.9	2.9	88.2	5.75	2.40
More dried meat	--	--	32.4	2.35	1.15

TABLE D-8 If you could design your own daily ration using the same types of bars as you had available and the same total number (11), how many of each type of bar would you want per day

TYPE OF BAR	MEAN	SD
Entree	2.61	0.83
Crispy Bread	0.97	0.47
Dairy	0.87	0.62
Fruit Beverage	1.42	0.66
Dessert	1.12	0.65
Cereal	1.25	0.51
Fruit Pockets	0.84	0.57
Cocoa Beverage	0.72	0.58
Beef Jerky	1.50	0.80

TABLE D-9 We would like to know how satisfied you were with the variety in each part of the ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

ENOUGH VARIETY	SHOULD HAVE SOMEWHAT MORE VARIETY	SHOULD HAVE MODERATELY MORE VARIETY	SHOULD HAVE MUCH MORE VARIETY
1	2	3	4

TYPE OF BAR	MEAN	SD
Entree	1.94	1.09
Crispy Bread	2.00	1.17
Dairy	1.97	1.22
Fruit Beverage	1.55	0.94
Dessert	2.18	1.19
Cereal	1.82	1.13
Fruit	1.56	0.98
Cocoa Beverage	1.97	1.30

TABLE D-10 How often did you have enough water available to rehydrate (mix with water) the food items that you wanted to rehydrate?

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

Mean ----- 3.18
SD ----- 1.59

TABLE D-11 How often was the amount of water you brought into the field enough to satisfy your thirst?

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

Mean ----- 4.30
SD ----- 1.55

TABLE D-12 Were you resupplied with water during the exercise?

Yes ----- 50.0%
No ----- 50.0%

TABLE D-13 Did you obtain additional pickup water?

Yes ----- 73.5%
No ----- 23.5%

TABLE D-14 If you did obtain pickup water, did you use iodine tablets to disinfect the water?

Yes ----- 45.2%
No ----- 48.4%

TABLE D-15 On the Average, how many quarts of water did you use each day for drinking and eating?

Mean ----- 1.96
SD ----- 0.68

TABLE D-16 How often did you rehydrate (mix with water) the dehydrated (dry) components of your ration?

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

TYPE OF BAR	MEAN	SD
Entree	4.79	0.64
Dairy	1.76	0.97
Fruit Beverage	3.32	1.30
Cereal	1.36	0.78

TABLE D-17 What were your reasons for NOT REHYDRATING (mixing with water) the dehydrated (dry) components of your ration? Circle ALL reasons that apply to you. If you always added water to your dry components, circle that one only.

REASON	% CIRCLED	% NOT CIRCLED
Dehydrated foods tasted better dry	35.3	64.7
Dehydrated foods had better texture dry	11.8	88.2
Not enough water available for mixing	35.3	64.7
Too much trouble to mix with water	26.5	73.5
Not enough time to mix with water	23.5	76.5
Other reasons	2.9	97.1
Always added water to dry rations	2.9	97.1

TABLE D-18 How often did you use HOT water to mix with the dehydrated (dry) entree bars of your ration?

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

MEAN ----- 3.85
SD ----- 1.18

TABLE D-19 What were your reasons for NOT using HOT water to rehydrate your entree bars? Circle ALL reasons that apply to you. If you ALWAYS used hot water, circle that one only.

REASON	% CIRCLED	% NOT CIRCLED
Entree bars tasted better with cold water	5.9	94.1
Entree bars had better texture with cold water	0.0	100.0
Not enough water available for rehydrating	11.8	88.2
No equipment available for heating	17.6	82.4
Too much trouble to heat water	14.7	85.3
Not enough time to heat water	23.5	76.5
Other reasons	5.9	94.1
Always heated my entree bars	41.2	58.8

TABLE D-20 For what reasons did you not eat enough during the exercise?

REASON	% CIRCLED	% NOT CIRCLED
Disliked the rations	20.6	79.4
Not enough rations	61.8	38.2
Not enough time to prepare rations	0.0	100.0
Too much trouble to prepare rations	0.0	100.0
Not enough time to eat	2.9	97.1
Too tired to eat	0.0	100.0
Too dark to eat	2.9	97.1
Other	2.9	97.1
Always ate enough during this exercise	23.5	76.5

TABLE D-21 Overall, did you get enough to eat or were you hungry?

1 - Got enough to eat
2 - Was sometimes hungry
3 - Was often hungry
4 - Was almost always hungry

Mean ----- 2.82
SD ----- 0.90

TABLE D-22 Overall, how CONVENIENT (easy) was the ration to use in the field?

EXTREMELY CONVENIENT	MODERATELY CONVENIENT	SLIGHTLY CONVENIENT	NEUTRAL
1	2	3	4

SLIGHTLY INCONVENIENT	MODERATELY INCONVENIENT	EXTREMELY INCONVENIENT
5	6	7

Mean ----- 2.47
SD ----- 1.52

TABLE D-23 For each of the items in the accessory packet, please indicate whether you needed more of the item, less of the item, or had just the right amount.

ITEM	% NEED MORE	% NEED LESS	% JUST THE RIGHT AMOUNT
Toilet Paper	6.3	9.4	81.3
Spoons	18.2	12.1	66.7
Matches	15.6	6.3	78.1
Sugar	36.4	0.0	60.6
Cream	39.4	0.0	57.6
Coffee (crystals)	39.4	6.1	51.5

TABLE D-24 Use the following scale to indicate how much you feel that eating your daily ration serves as a source of diversion/entertainment to break up the day, or as a way to kill time when not performing mission duties.

UNNECESSARY DIVERSION	USEFUL DIVERSION	NECESSARY DIVERSION
1	2	3

Mean ----- 1.94
SD ----- 0.78

TABLE D-25 What are the MOST IMPORTANT factors in a combat ration for a mission such as the one you were on? Please rank the factors below by placing a "1" next to the most important factor, and a "2" next to the second most important factor, and so on for the third, fourth, and fifth factors.

	PERCENTAGE OF IMPORTANCE						RANK	
FACTOR	1ST	2ND	3RD	4TH	5TH	UNRANKED	MEAN	SD
Light weight	29.4	38.2	14.7	2.9	5.9	8.8	2.10	1.11
Takes up little space	29.4	26.5	20.6	8.8	8.8	5.9	2.38	1.29
Tastes good	11.8	--	20.6	2.9	58.8	5.9	4.03	1.43
Stops my hunger	8.8	11.8	8.8	64.7	--	5.9	3.38	1.04
Gives me enough energy to do my job	38.2	14.7	26.5	5.9	11.8	2.9	2.36	1.39

TABLE D-26 Please rate the ration that you ate on this mission on each of the factors below.

EXCELLENT	GOOD	FAIR	POOR
1	2	3	4

FACTOR	MEAN	SD
Light weight	1.46	0.75
Takes up little space	1.52	0.76
Tastes good	2.21	0.99
Stops my hunger	3.42	0.66
Gives me enough energy to do my job	2.97	0.98

Appendix E

FPA

POSTTEST QUESTIONNAIRE

RESULTS

TABLE E-1 Time in the Armed Forces/Months

Mean ----- 53.62
SD ----- 62.19

TABLE E-2 Rank	Percentage
Private First Class	38.1
Specialist-4	9.5
Corporal	19.0
Buck Sergeant	9.5
Specialist-5	4.8
Sergeant First Class	4.8

TABLE E-3 Group	Percentage
Command and Control	47.6
Radio	23.8
Reconnaissance	28.6

TABLE E-4 Please use the following scale to indicate how much you liked or disliked each of the items in the ration you ate by circling the number that best expresses your opinion.

DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE
1	2	3	4	5

LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
6	7	8	9

		MEAN	SD
ENTREE BARS:	Beef and Vegetables	6.33	2.11
	Chicken Stew	6.57	1.43
	Chicken & Rice	6.10	1.79
	Chicken ala King	6.67	1.74
	Spaghetti & Meat Sauce	6.71	1.98
	Pork with Scalloped Potatoes	5.65	2.25
DESSERTS:	Oatmeal Cookie	8.10	1.61
	Granola	6.19	2.34
	Fig	8.29	1.15
	Chocolate/Fudge	5.14	2.18
	Chocolate Pudding	6.42	2.32
	Vanilla Pudding	5.52	2.54
ORANGE BEVERAGE BAR		7.62	1.50
BEEF JERKEY		7.62	1.75
PEPPERONI		7.76	2.10

TABLE E-5 Overall, do you feel that this ration had a positive (good) or negative (bad) effect on your mission performance?

Extremely Positive Effect 1	Moderately Positive Effect 2	Slightly Positive Effect 3	No Effect Either Way 4

Slightly Negative Effect 5	Moderately Negative Effect 6	Extremely Negative Effect 7

Mean ----- 4.14
SD ----- 1.15

TABLE E-6 If you had only this ration to eat, how many days would you have been able to eat it without it adversely affecting your mission performance?

Mean ----- 12.64
SD ----- 6.95

TABLE E-7 If changes were to be made to the rations that you ate on this mission, what characteristic of the ration would you most want to see changed? Please identify the five most important changes by placing a "1" next to the most important change a " next to the second most important, etc.

PERCENTAGE OF IMPORTANCE

CHANGES	1st	2nd	3rd	4th	5th	6th	7th
Be lighter	--	4.8	--	14.3	9.5	4.8	4.8
Take up less space	4.8	4.8	9.5	9.5	9.5	9.5	4.8
Easier to open	4.8	--	--	9.5	9.5	--	--
Less rehydrating	9.5	4.8	9.5	4.8	14.3	14.3	--
Rehydrate faster	--	4.8	14.3	--	9.5	14.3	19.0
Less thirst	19.0	4.8	9.5	4.8	9.5	--	--
Taste better	9.5	14.3	14.3	9.5	--	4.8	--
More variety	19.0	14.3	14.3	4.8	4.8	--	4.8
More filling	33.3	4.8	14.3	9.5	4.8	--	4.8
Not crumble	--	--	--	4.8	14.3	--	4.8
More dried meat	14.3	14.3	14.3	14.3	4.8	--	--

PERCENTAGE OF IMPORTANCE (cont)

	8th	9th	10th	11th	UNRANKED	MEAN	SD
Be lighter	4.8	--	9.5	4.8	42.9	6.33	2.87
Take up less space	--	9.5	4.8	--	33.3	5.29	2.73
Easier to open	4.8	4.8	4.8	14.3	47.6	7.18	3.52
Less rehydrating	--	--	--	4.8	38.1	4.46	2.67
Rehydrate faster	--	--	--	--	38.1	5.15	1.82
Less thirst	9.5	--	--	--	42.9	3.50	2.58
Taste better	14.3	4.8	4.8	--	23.8	4.63	3.05
More variety	4.8	4.8	--	--	28.6	3.47	2.64
More filling	--	--	--	4.8	23.8	3.06	2.77
Not crumble	4.8	14.3	4.8	9.5	42.9	7.75	2.49
More dried meat	--	4.8	9.5	--	23.8	4.00	3.06

TABLE E-8 If you could design your own daily ration using the same types of bars as you had available and the same total number (11), how many of each type of bar would you want per day

TYPE OF BAR	MEAN	SD
Entree	3.43	0.98
Granola	0.57	0.60
Oatmeal Cookie	2.00	0.71
Chocolate/Fudge	0.52	0.75
Pudding	0.57	0.81
Orange Beverage	1.19	0.75
Fig	1.57	0.87
Beef Jerky/Pepperoni	1.65	0.75

TABLE E-9 We would like to know how satisfied you were with the variety in each part of the ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

ENOUGH VARIETY	SHOULD HAVE SOMEWHAT MORE VARIETY	SHOULD HAVE MODERATELY MORE VARIETY	SHOULD HAVE MUCH MORE VARIETY
1	2	3	4

TYPE OF BAR	MEAN	SD
Entree	2.48	1.08
Granola/Oatmeal	1.95	1.16
Chocolate/Fudge	2.75	1.29
Pudding	2.30	1.13
Beverage	3.24	0.94
Fig/Fruit	2.00	1.18
Dried Meats	2.43	1.12

TABLE E-10 How often did you have enough water available to rehydrate (mix with water) the food items that you wanted to rehydrate?

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

Mean ----- 2.48
SD ----- 1.40

TABLE E-11 How often was the amount of water you brought into the field enough to satisfy your thirst?

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

Mean ----- 3.29
SD ----- 1.88

TABLE E-12 Were you resupplied with water during the exercise?

Yes ----- 61.9%
No ----- 38.1%

TABLE E-13 Did you obtain additional pick-up water?

Yes ----- 70.0%
No ----- 30.0%

TABLE E-14 If you did obtain pick-up water, did you use iodine tablets to disinfect the water?

Yes ----- 53.3%
No ----- 46.7%

TABLE E-15 On the Average, how many quarts of water did you use each day for drinking and eating?

Mean ----- 1.99
SD ----- 0.84

TABLE E-16 How often did you rehydrate (mix with water) the dehydrated (dry) components of your ration?

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

TYPE OF BAR	MEAN	SD
Entree	4.52	0.98
Pudding	4.05	1.36
Beverage	2.86	1.35

TABLE E-17 What were your reasons for NOT REHYDRATING (mixing with water) the dehydrated (dry) components of your ration? Circle ALL reasons that apply to you. If you always added water to your dry components, circle that one only.

REASON	% CIRCLED	% NOT CIRCLED
Dehydrated foods tasted better dry	19.0	81.0
Dehydrated foods had better texture dry	19.0	81.0
Not enough water available for mixing	19.0	81.0
Too much trouble to mix with water	33.3	66.7
Not enough time to mix with water	14.3	85.7
Other reasons	4.8	95.2
Always added water to dry rations	23.8	76.2

TABLE E-18 How often did you use HOT water to mix with the dehydrated (dry) entree bars of your ration?

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

MEAN ----- 4.05
SD ----- 1.24

TABLE E-19 What were your reasons for NOT using HOT water to rehydrate your entree bars? Circle ALL reasons that apply to you. If you ALWAYS used hot water, circle that one only.

REASON	% CIRCLED	% NOT CIRCLED
Entree bars tasted better with cold water	0.0	100.0
Entree bars had better texture with cold water	0.0	100.0
Not enough water available for rehydrating	9.5	90.5
No equipment available for heating	38.1	61.9
Too much trouble to heat water	14.3	85.7
Not enough time to heat water	14.3	85.7
Other reasons	9.5	90.5
Always heated my entree bars	52.4	47.6

TABLE E-20 For what reasons did you not eat enough during the exercise?

REASON	% CIRCLED	% NOT CIRCLED
Disliked the rations	23.8	76.2
Not enough rations	47.6	52.4
Not enough time to prepare rations	4.8	95.2
Too much trouble to prepare rations	4.8	95.2
Not enough time to eat	14.3	85.7
Too cold to stop and eat	0.0	100.0
Too tired to eat	9.5	90.5
Too dark to eat	0.0	100.0
Other	0.0	100.0
Always ate enough during this exercise	28.6	71.4

TABLE E-21 Overall, did you get enough to eat or were you hungry?

1 - Got enough to eat
2 - Was sometimes hungry
3 - Was often hungry
4 - Was almost always hungry

Mean ----- 2.52
SD ----- 0.93

TABLE E-22 Overall, how CONVENIENT (easy) was the ration to use in the field?

EXTREMELY CONVENIENT 1	MODERATELY CONVENIENT 2	SLIGHTLY CONVENIENT 3	NEUTRAL 4

SLIGHTLY INCONVENIENT 5	MODERATELY INCONVENIENT 6	EXTREMELY INCONVENIENT 7

Mean ----- 2.62
SD ----- 1.50

TABLE E-23 For each of the items in the accessory packet, please indicate whether you needed more of the item, less of the item, or had just the right amount.

ITEM	% NEED MORE	% NEED LESS	% JUST T RIGHT AMO
Toilet Paper	14.3	4.8	81.0
Spoons	4.8	14.3	81.0
Matches	4.8	14.3	81.0
Sugar	47.6	14.3	38.1
Salt	4.8	19.0	76.2
Cream	38.1	9.5	52.4
Chewing Gum	61.9	4.8	28.6
Coffee	47.6	14.3	38.1

TABLE E-24 Use the following scale to indicate how much you feel that eating your daily ration serves as a source of diversion/entertainment to break up the day, or as a way to kill time when not performing mission duties.

UNNECESSARY DIVERSION 1	USEFUL DIVERSION 2	NECESSARY DIVERSION 3

Mean ----- 2.35
SD ----- 0.59

TABLE E-25 What are the MOST IMPORTANT factors in a combat ration for a mission such as the one you were on? Please rank the factors below by placing a "1" next to the most important factor, and a "2" next to the second most important factor, and so on for the third, fourth, and fifth factors.

	PERCENTAGE OF IMPORTANCE							
FACTOR	1ST	2ND	3RD	4TH	5TH	UNRANKED	MEAN	SD
Light weight	19.0	42.9	14.3	9.5	9.5	4.8	2.45	1.23
Takes up little space	23.8	23.8	38.1	4.8	9.5	0.0	2.52	1.21
Tastes good	--	4.8	19.0	28.6	42.9	4.8	4.15	0.93
Stops my hunger	19.0	19.0	9.5	33.3	19.0	0.0	3.14	1.46
Gives me enough energy to do my job	57.1	19.0	9.5	9.5	4.8	0.0	1.86	1.24

TABLE E-26 Please rate the ration that you ate on this mission on each of the factors below.

EXCELLENT	GOOD	FAIR	POOR
1	2	3	4

FACTOR	MEAN	SD
Light weight	1.91	0.89
Takes up little space	2.52	0.81
Tastes good	2.33	0.73
Stops my hunger	3.14	0.91
Gives me enough energy to do my job	2.57	0.93

END

10-87

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